

**BEST OF  
WHAT'S  
NEW**  
**2010**

# TOP TECH AWARDS

p.29

# POPULAR SCIENCE

THE  
FUTURE  
NOW

**MACH  
10**

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Rail-Gun Scramjet

## 100 BEST INNOVATIONS

OF THE  
YEAR



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Plug-in supercar:  
The breakthrough  
Porsche 918 Spyder  
hybrid concept



### ROAD-READY SPEEDBOAT

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### PERSONAL DRONE

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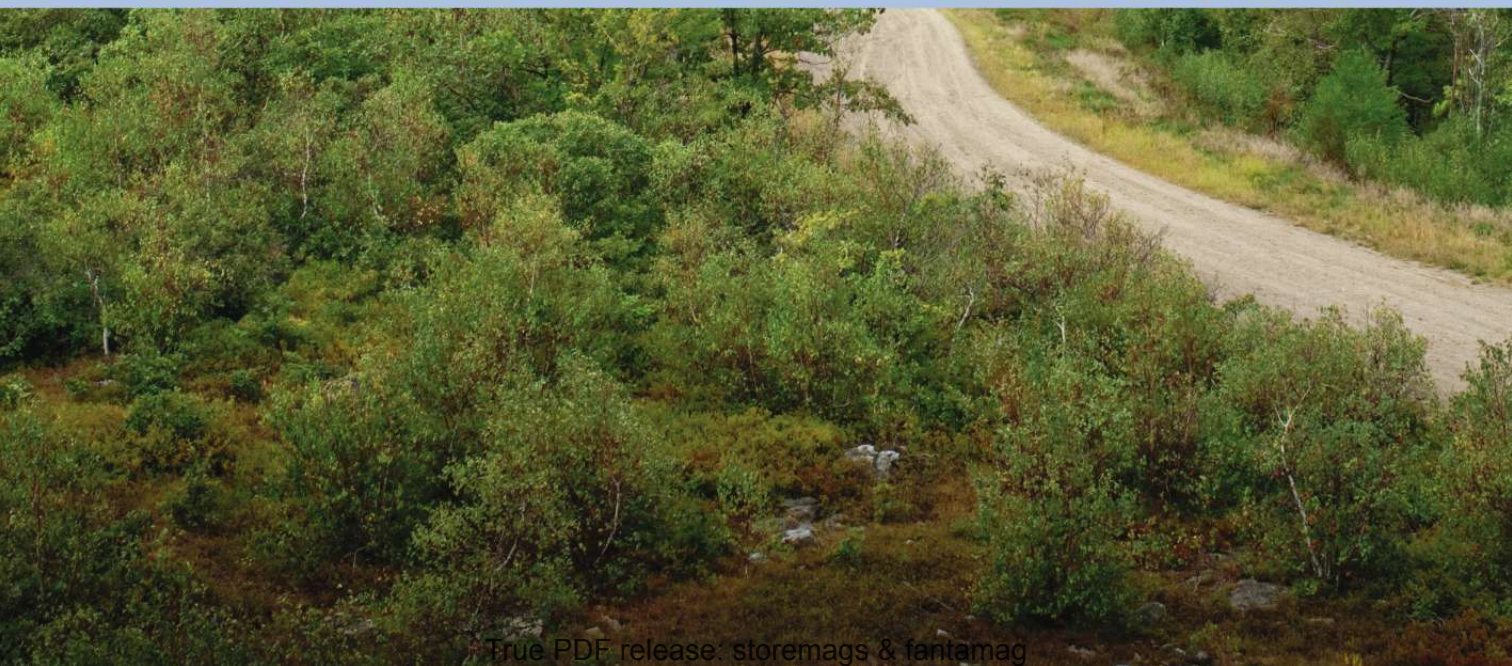
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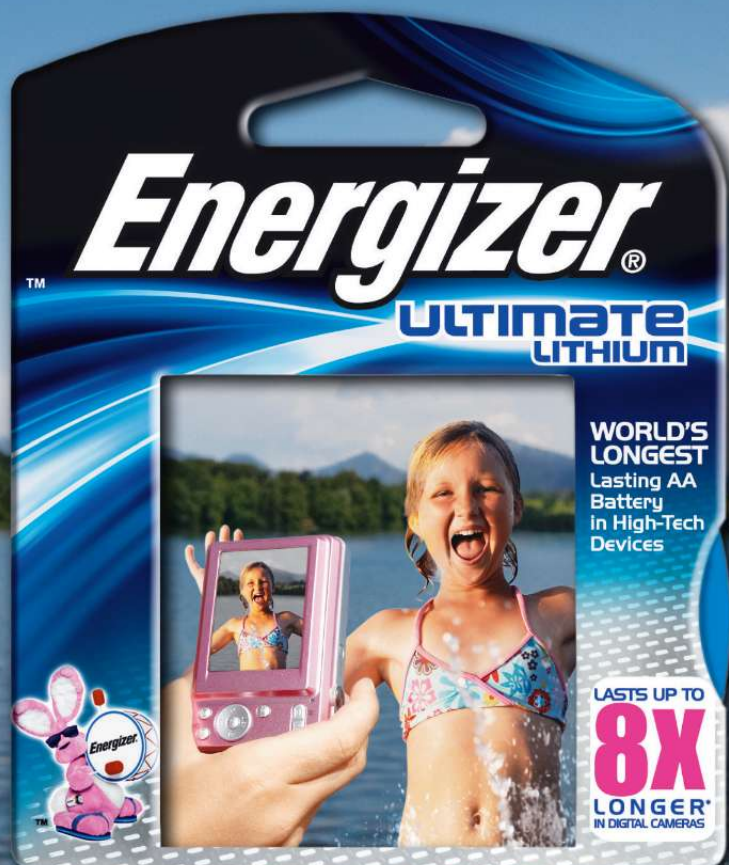
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DECEMBER '10  
VOLUME 277 #6

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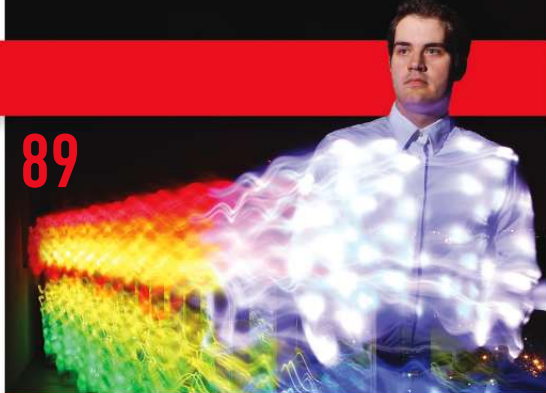
*Popsci.com/BOWN* is the expanded and enhanced Best of What's New online, with plenty of extras about the most important products of the year.

### Testing the Best

We test the Parrot AR.Drone (above), the cellphone-recycling machine and more of the year's standout tech.



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See the Ferrari 458 Italia tear up the track, the view from the top of the record-breaking Burj Khalifa skyscraper, and much more in our expanded multimedia section.



### GOT QUESTIONS?

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CLOCKWISE FROM TOP LEFT: PIXELGARDEN.COM; JOHN B. CARNETT; NICK MERRICK/HEDRICH BLESSING/SOM; FERRARI S.P.A.; BRIAN KLUTCH; GRAHAM MURDOCH



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## FROM THE EDITOR

## THE MOST MARVELOUS TIME OF THE YEAR



IT'S ONE OF THE MOST enjoyable parts of my job: the moment in mid-October when a binder is dropped on my desk containing each page of our December Best of What's New issue slotted sequentially into place so that I can truly immerse myself in this, our annual celebration of superlative technological innovation. I flip and peruse, slow and steady, trying to capture the full sweep before going back through and allowing myself to get sucked in by individual marvels. By the time I'm done poring over the

entire package, I'm reliably gobsmailed by what human ingenuity has delivered in a single year. A solar-powered plane that will fly all night. A remote-controlled rescue buoy that can speed to a drowning swimmer 10 times as fast as any lifeguard. A completely reinvented crutch that's actually comfortable to use. And 97 more! No matter how gloomy my mood, no matter what ails me, this is a cure for it.

## A duel between power and practicality, adrenaline and virtue

Another of my cherished tasks at this time of year is to referee the debate here about which of the honorees will be anointed with our grandest Grand Award, Innovation of the Year. I still remember with fond nostalgia the 2006 battle, when the \$1.2-million Bugatti Veyron lost out to Bostitch's one-cent HurriQuake nail. And this year we had a similar contest, a duel between power and practicality, engineering audacity and design elegance, adrenaline and virtue. The Porsche 918 Spyder concept hybrid supercar was a tough contender, demonstrating that a top speed of 198 mph and a top fuel efficiency of 78 mpg can coexist under the same extremely beautiful hood. But even the realization of no-compromise motoring was not a match for our ultimate winner, an ingeniously simple and inexpensive green box that will make it possible to grow trees in the Sahara. To see why the Groasis Waterboxx is our Innovation of the Year, turn to page 31.

And if you disagree with our choice, drop me a line.

MARK JANNOT

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## CHECK IT OUT



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## THE INBOX

**SAFE HOUSE:** October's Future of the Home issue featured bold visions for living in extreme conditions. Architects showed us that with the right technology, humans can comfortably inhabit just about anyplace, be it a flood zone, crowded city or encroaching desert. A few readers, however, thought some of the solutions would impose more environmental costs than the creations they were designed to address.

### Suspension of Belief

I did a double take when I read about powerful electromagnets holding residences to cables ["Life on the Edge"]. Continuously powering those magnets would consume a huge amount of electricity. And what happens when there's a power outage? It seems the same thing could be accomplished with some kind of fasteners that don't require electricity.

**Denny Kayser**  
Chelmsford, Mass.



### Frack of Nature

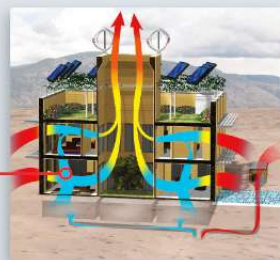
Although hydraulic fracturing has much potential ["Instant Expert: Unnatural Gas"], it presents too many risky unknowns. Much of the fluid used to fracture shale formations and extract natural gas remains underground, and little is known about what happens to it there. In some cases, fracking has been linked to natural gas entering water wells. With all the worry about future water supplies, I think it's a bad idea to exploit this technology without more research on its environmental impact.

**Dan McPherson**  
Via e-mail

### Corrections

In "Life on the Edge," we identified the designer of Positive Impact House as Robert Perry. His name is Robert Ferry. Additionally, the illustration of the house should have depicted cool air circulating and warm air leaving through the courtyard, as shown here.

In "Instant Expert: Unnatural Gas," we should have noted that the representation of the hydraulic fracturing process was not illustrated to scale.



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# WHAT THE NEW CAR HAS BEEN WAITING FOR.

## Introducing the WattStation™

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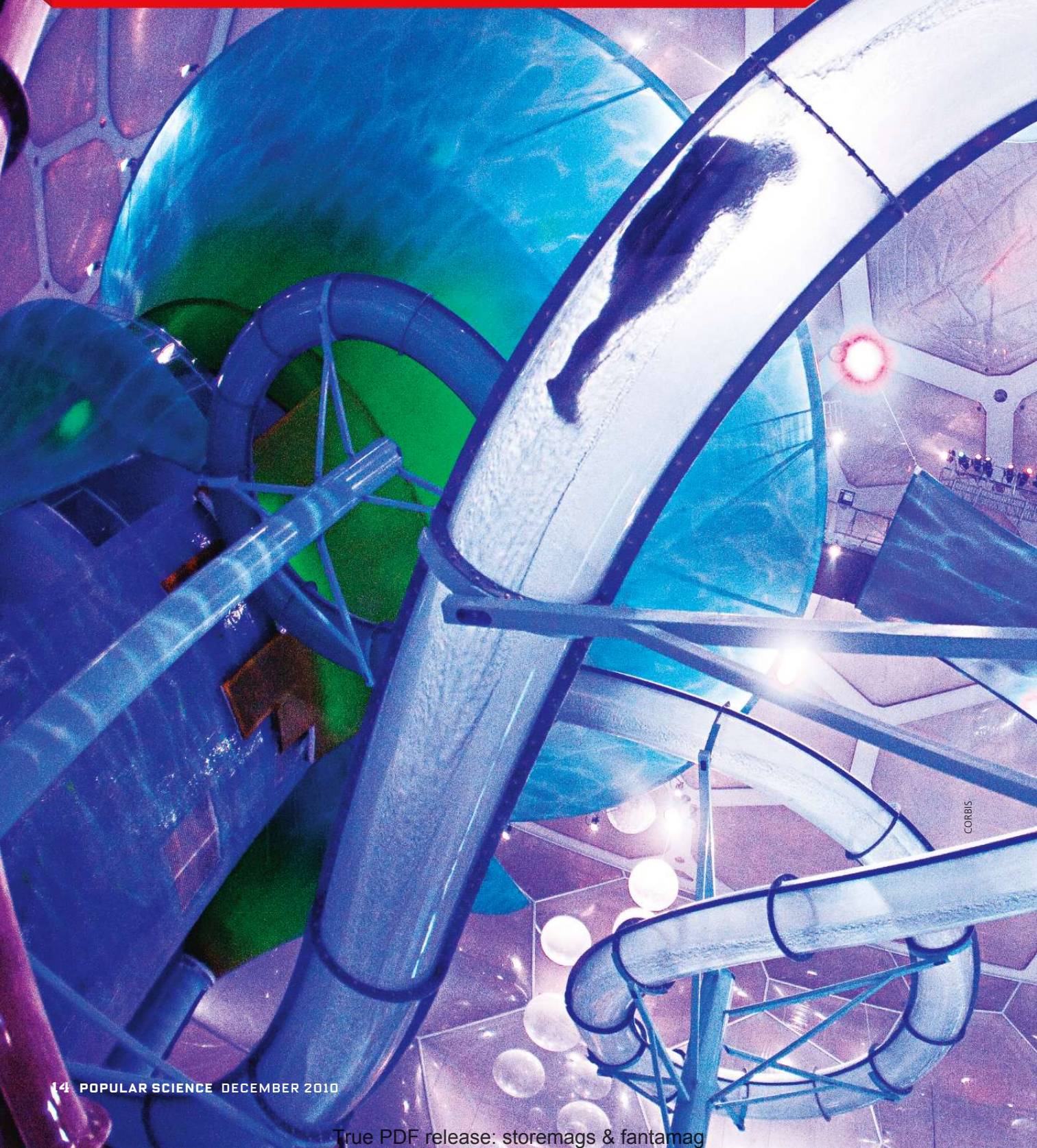
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# MEGAPIXELS

THE MUST-SEE PHOTOS OF THE MONTH



CORBIS





# FUN, CUBED

**High-tech water rides turn a competitive swimming arena into a place of leisure**

The Beijing National Aquatics Center, or Water Cube, was built to house the swimming events of the 2008 Olympics. (Its polymer walls, which reduce energy costs by minimizing the need for lighting and heating, won a PopSci Best of What's New award in 2006.) The building's designers intended for it to live on after the Olympics, however, and in August it revealed a new purpose after a 10-month metamorphosis. The center now houses the Happy Magic Watercube water park, a tangle of state-of-the-art rides such as the Aqua-Loop, a vertically looping waterslide with a unique launch system—the floor drops out from under the rider—and the Body Slide [left]. Happy Magic's \$30 entrance fee is about one ninth the average monthly income of local residents, yet it has attracted thousands of visitors every day since it opened.

BY NATALIE WOLCHOVER

PHOTOGRAPH BY HOW HWEE YOUNG



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# HEADLINES

## DISCOVERIES, ADVANCES AND DEBATES IN SCIENCE


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Scramjet + rail gun = Mach 10


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Growing veggies on the moon

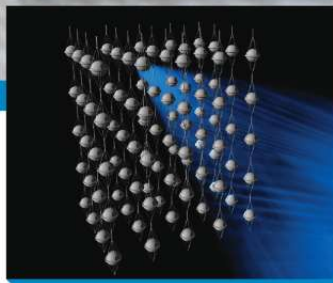

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Big-money science prizes you can win

### PHYSICS

# DEEP FREEZE

A science experiment in South Pole ice searches for clues about how the universe—and dark matter—works



**Every December** since 2004, engineers have flown to the South Pole to drill 8,000-foot-deep holes in the ice. The team lowers cables, each strung with 60 disco-ball-size light sensors, into the holes and lets them freeze over. So far they have completed 79 such holes, set in a grid half a mile on each side, and plan to drill the final seven this month. The result will be the IceCube Neutrino Observatory, a cube of ice packed with 5,320 sensors looking for cosmic particles.

Neutrinos are subatomic particles created by radioactive decay or nuclear reactions. Like other types of extrasolar radiation, they emerge from energetic cosmic

events and constantly bombard Earth. Neutrinos are unique among cosmic particles, however, in that they carry no electric charge. The magnetic fields of stars and planets bend the paths of charged particles, making it impossible for scientists to identify their origin. But neutrinos fly in a straight line: Catch one, and you can trace it back to whatever produced it, which makes them one of the easiest means of probing the far reaches of the universe.

Detecting a neutrino, however, is a bit like trying to catch a flea with a fishing net—the particles are so small that trillions of them travel through Earth every second without even hitting an atom. So the

### SUB-ZERO SCIENCE

**Clockwise from left: A photo sensor is lowered into the ice, IceCube engineers begin drilling a hole, a test photo sensor frozen in surface ice, and an illustration of light from a neutrino passing through the detector.**

researchers at IceCube employ a clever technique to spot indirect evidence of neutrinos.

Every day, several dozen neutrinos passing through IceCube will hit a hydrogen or oxygen atom in the ice and eject another particle, called a muon, that emits a blue light. In Antarctica's nearly pure ice, the photo sensors can spot such a flash a football field away, and with dozens of sensors registering each muon, scientists can triangulate the

CLOCKWISE FROM TOP LEFT: COURTESY MARK KRASBERG/NSF; COURTESY NSF (3)

**FOOTNOTES** **SEPTEMBER 29** Astronomers find Gliese 581g, the first known exoplanet with temperatures that might make liquid—and therefore life—possible.



# EXPRESS TRAIN TO SPACE

NASA engineers propose combining a rail gun and a scramjet to fire spacecraft into orbit

## PRICE POINT

Each space-shuttle launch costs \$450 million. The rail gun/scramjet will take more than twice that to develop, but each flight would cost much less.

In April, President Obama urged NASA to come up with, among other things, a less expensive method than conventional rocketry for launching spacecraft. By September, the agency's engineers floated a plan that would save millions of dollars in propellant, improve astronaut safety, and allow for more frequent flights. All it will take is two miles of train track, an airplane that can fly at 10 times the speed of sound, and a jolt of electricity big enough to light a small town.

The system calls for a two-mile-long rail gun that will launch a scramjet, which will then fly to 200,000 feet. The scramjet will then fire a payload into orbit and return to Earth. The process is more complex than a rocket launch, but engineers say it's also more flexible. With it, NASA could orbit a 10,000-pound satellite one day

and send a manned ship toward the moon the next, on a fraction of the propellant used by today's rockets.

It may sound too awesome to ever be a reality. But unlike other rocket-less plans for space entry, each relevant technology is advanced enough that tests could take place in 10 years, says Stan Starr, a physicist at NASA's Kennedy Space Center. NASA's scramjets have hit Mach 10 for 12 seconds; last spring, Boeing's X-51 scramjet did Mach 5 for a record 200 seconds. Rail guns are coming along too. The Navy is testing an electromagnetic launch system to replace the hydraulics that catapult fighter jets from aircraft carriers. "We have all the ingredients," says Paul Bartolotta, a NASA aerospace engineer working on the project. "Now we just have to figure out how to bake the cake."—RENA MARIE PACELLA

## 1. REV UP THE RAIL GUN

A 240,000-horsepower linear motor converts 180 megawatts into an electromagnetic force that propels a scramjet carrying a spacecraft down a two-mile-long track. The craft accelerates from 0 to 1,100 mph (Mach 1.5) in under 60 seconds—fast, but at less than 3 Gs, safe for manned flight.

## 2. FIRE THE SCRAMJET

The pilot fires a high-speed turbojet and launches from the track. Once the craft hits Mach 4, the air flowing through the jet intake is fast enough that it compresses, heats to 3,000°F, and ignites hydrogen in the combustion chamber, producing tens of thousands of pounds of thrust.

## 3. GET INTO ORBIT

At an altitude of 200,000 feet, there isn't enough air for the scramjet, now traveling at Mach 10, to generate thrust. Here spaceflight begins. The two craft separate, and the scramjet pitches downward to get out of the way as the upper spacecraft fires tail rockets that shoot it into orbit.

## 4. STICK THE LANDING

The scramjet slows and uses its turbojets to fly back to Earth for a runway landing. Once the spacecraft delivers its payload into orbit, it reenters the atmosphere and glides back to the launch site. The two craft can be ready for another mission within 24 hours of landing.

neutrino's exact path through the ice and extrapolate it to its source.

IceCube's size allows it to measure ultra-high-energy neutrinos, particles that pack as much energy as one of Roger Federer's serves, says Spencer Klein, a physicist at Lawrence Berkeley National Laboratory who will monitor IceCube's output. The sources of these neutrinos, he says, are mysterious. The main suspects are super-massive black holes that spit intense jets

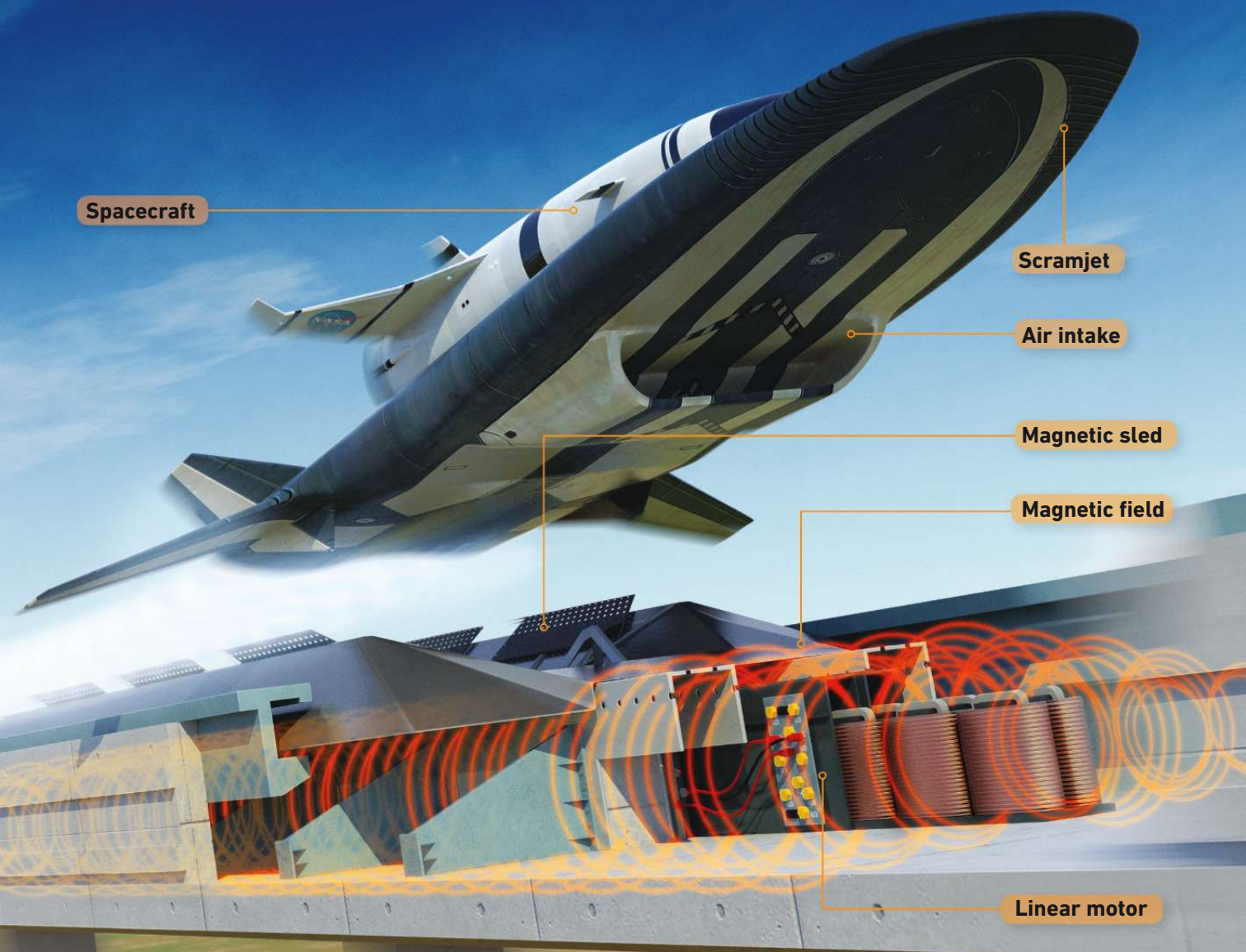
of particles, or collisions involving a neutron star and a black hole. "Or maybe something unknown," Klein says. "It's hard to explain how you get such energetic particles, but it's clear that they exist."

The unknown something, he says, could be dark matter, the invisible mass that makes up 90 percent of the universe. The existence of dark matter was proposed in 1933, but scientists still know very little about what it is or how it acts. One

theory is that it consists of weakly interacting particles. If enough of these particles congregate, they might annihilate one another and produce a burst of neutrinos, which IceCube could detect to help reveal some characteristics of dark matter. If the neutrinos originate from the Earth or sun, it would confirm that dark-matter particles exist and that they are attracted by gravity. And if the sun emits relatively more neutrinos than Earth, that's an indication

**OCTOBER 9** Google reveals that it has seven driverless cars that have together logged some 140,000 miles on American roads, though with a backup human behind the wheel just in case.





**EVERY TIME  
SCIENTISTS TURN  
A HIGHER FIDELITY  
TOOL TO THE  
COSMOS, THEY FIND  
SOMETHING NEW.**

GRAHAM MURDOCH

that dark-matter particles interact more strongly with hydrogen, which provides insight into the matter's quantum behavior.

Once IceCube's final seven strands of sensors are in place, it will detect 100 neutrinos a day, 14 times as many as the two-year-old French neutrino detector Antares. IceCube will not only help scientists identify the source of cosmic rays, dark matter and other objects that influence the universe's evolution,

it will also produce unexpected discoveries, says Francis Halzen, the principal investigator on IceCube. From Galileo's refracting spyglass to the Hubble Space Telescope, he notes, every time scientists turn a higher-fidelity tool to the cosmos, they find something new. "If IceCube observes separated pairs of particles, they might be supersymmetric, a new and very different type of matter," Klein says. "That would be extremely exciting." —JOHN BRANDON

**OCTOBER 10** Virgin Galactic's spaceplane *SpaceShipTwo* makes its first manned flight. After separating from its mother ship at 45,000 feet, the plane glided to a safe landing.





COURTESY UA/CEAC

## MESCLUN ON THE MOON

A new greenhouse could provide food and oxygen to an entire lunar colony

When astronauts next land on the moon, they're likely to whip up a celebratory dinner of freeze-dried macaroni and cheese. But a new self-building greenhouse could supplement that meal with a fresh salad to eat and oxygen to breathe.

The greenhouse, constructed at the University of Arizona, is a plant-based life-support system. A capsule on the moon would pop open, like a camping tent, into four 18-foot-long, seven-foot-wide cylindrical greenhouses, each packed with seeds, sodium-vapor lights and everything else needed to grow a garden. A rover would bury the greenhouse in lunar soil to protect the plants from cosmic rays.

### FIRST SUPPERS

In 1962 John Glenn became the first person to eat in space. The menu: applesauce from a tube. On the moon in 1969, Neil Armstrong and Buzz Aldrin dined on bacon squares and beef stew.

On the moon, the hydroponic farms could use a few hundred gallons of plant food to grow more than 800 pounds of vegetation in a few months. Carbon-dioxide-rich air from astronauts' living quarters would be pumped into the greenhouse to support photosynthesis, keeping the system self-sustainable. In September the researchers completed a NASA-funded eight-month test run of an 18-by-7-foot collapsible prototype that produced enough harvestable sweet potatoes, lettuce, tomatoes and strawberries each day to meet half the caloric requirements of one person.

The team hopes to secure a second NASA award this winter to

scale up to support four people and design a system to recycle vegetation and sewage into fertilizer. They also need to determine how to time plantings to keep oxygen flowing. Says Gene Giacomelli, a project co-leader, "You don't want to enjoy your dinner tonight and run out of oxygen tomorrow." —SUSANNAH F. LOCKE



**OCTOBER 11** Biotech company Geron starts the world's first human trial of embryonic stem cells. The cells will be used to treat patients with new spinal-cord injuries.



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- Your gout may flare up when you start taking ULORIC; do not stop taking your ULORIC even if you have a flare. Your healthcare provider may give you other medicines to help prevent your gout flares.
- A small number of heart attacks, strokes, and heart-related deaths were seen in clinical studies. It is not certain that ULORIC caused these events.
- Tell your healthcare professional about liver or kidney problems or a history of heart disease or stroke.
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Use ScanLife or text GOUT to 299669. You can also download a QR-Code Reader at [www.2dscan.com](http://www.2dscan.com).

Message and data rates may apply.  
May not be available on all devices.

**Uloric**<sup>®</sup>  
(febuxostat) 40 mg | 80 mg  
tablets

For more information, visit [www.ULORIC.com](http://www.ULORIC.com) or call 1-877-ULORIC-6.



# PATIENT INFORMATION

## ULORIC® (Ū-'lor-ik) (febuxostat) tablets



Read the Patient Information that comes with ULORIC before you start taking it and each time you get a refill. There may be new information. This information does not take the place of talking with your healthcare provider about your medical condition or your treatment.

### WHAT IS ULORIC?

ULORIC is a prescription medicine called a xanthine oxidase (XO) inhibitor, used to lower blood uric acid levels in adults with gout.

It is not known if ULORIC is safe and effective in children under 18 years of age.

### WHO SHOULD NOT TAKE ULORIC?

#### Do not take ULORIC if you:

- take Azathioprine (Azasan®, Imuran®)
- take Mercaptopurine (Purinethol®)
- take Theophylline (Theo-24®, Elixophyllin®, Theochron®, Theolair®, Uniphyll®)

It is not known if ULORIC is safe and effective in children under 18 years of age.

### WHAT SHOULD I TELL MY HEALTHCARE PROVIDER BEFORE TAKING ULORIC?

Before taking ULORIC tell your healthcare provider about all of your medical conditions, including if you:

- have liver or kidney problems
- have a history of heart disease or stroke
- are pregnant or plan to become pregnant. It is not known if ULORIC will harm your unborn baby. Talk with your healthcare provider if you are pregnant or plan to become pregnant.
- are breast-feeding or plan to breast-feed. It is not known if ULORIC passes into your breast milk. You and your healthcare provider should decide if you should take ULORIC while breast-feeding.

Tell your healthcare provider about all the medicines you take, including prescription and non-prescription medicines, vitamins, and herbal supplements. ULORIC may affect the way other medicines work, and other medicines may affect how ULORIC works.

Know the medicines you take. Keep a list of them and show it to your healthcare provider and pharmacist when you get a new medicine.

### HOW SHOULD I TAKE ULORIC?

- Take ULORIC exactly as your healthcare provider tells you to take it.
- ULORIC can be taken with or without food.
- ULORIC can be taken with antacids.
- Your gout may flare up when you start taking ULORIC, do not stop taking your ULORIC even if you have a flare. Your healthcare provider may give you other medicines to help prevent your gout flares.
- Your healthcare provider may do certain tests while you take ULORIC.

### WHAT ARE THE POSSIBLE SIDE EFFECTS OF ULORIC?

Heart problems. A small number of heart attacks, strokes and heart-related deaths were seen in clinical studies. It is not certain that ULORIC caused these events.

The most common side effects of ULORIC include:

- liver problems
- nausea
- gout flares
- joint pain
- rash

Tell your healthcare provider if you have any side effect that bothers you or that does not go away. These are not all of the possible side effects of ULORIC. For more information, ask your healthcare provider or pharmacist.

Call your doctor for medical advice about side effects. You may report side effects to the FDA at 1-800-FDA-1088.

### HOW SHOULD I STORE ULORIC?

Store ULORIC between 59°F - 86°F (15°C - 30°C).

Keep ULORIC out of the light.

Keep ULORIC and all medicines out of the reach of children.

### GENERAL INFORMATION ABOUT THE SAFE AND EFFECTIVE USE OF ULORIC.

Medicines are sometimes prescribed for purposes other than those listed in a patient information leaflet. Do not use ULORIC for a condition for which it was not prescribed. Do not give ULORIC to other people, even if they have the same symptoms that you have. It may harm them.

This patient information leaflet summarizes the most important information about ULORIC. If you would like more information about ULORIC talk with your healthcare provider. You can ask your healthcare provider or pharmacist for information about ULORIC that is written for health professionals. For more information go to [www.uloric.com](http://www.uloric.com), or call 1-877-825-3327.

### WHAT ARE THE INGREDIENTS IN ULORIC?

Active Ingredient: febuxostat

Inactive ingredients include: lactose monohydrate, micro-crystalline cellulose, hydroxypropyl cellulose, sodium croscarmellose, silicon dioxide, magnesium stearate, and Opadry II, green



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Deerfield, IL 60015  
U.S. Patent Nos. - 6,225,474; 7,361,676; 5,614,520.

ULORIC® is a registered trademark of Teijin Pharma Limited and used under license by Takeda Pharmaceuticals America, Inc.  
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P11114 R1.cfbf/February 2009 L-TXF-0209-17

### NEED HELP PAYING FOR PRESCRIPTIONS?

Takeda Help At Hand provides patients with options for receiving free or low-cost medications. For more information, visit [www.takedahelpathand.com](http://www.takedahelpathand.com).



Patient Assistance Within Reach



## HEADLINES DISASTER TECH

## PREDICT-A-QUAKE

Underground radon detectors could forecast earthquakes days before they happen

**Toads. Clouds. Radon gas.** Scientists have studied the movement of each of these in desperate attempts to improve earthquake detection methods by even just a few minutes. Now there's a technology to test the radon theory for good and possibly give warning days before a quake.

As uranium in the earth decays, it emits radon gas, some of which collects in pockets underground. Some seismologists hypothesize that earth shifts imperceptibly in the days before a quake, causing fractures that puncture the pockets and release more radon. But it would take a lot of data to test the theory.

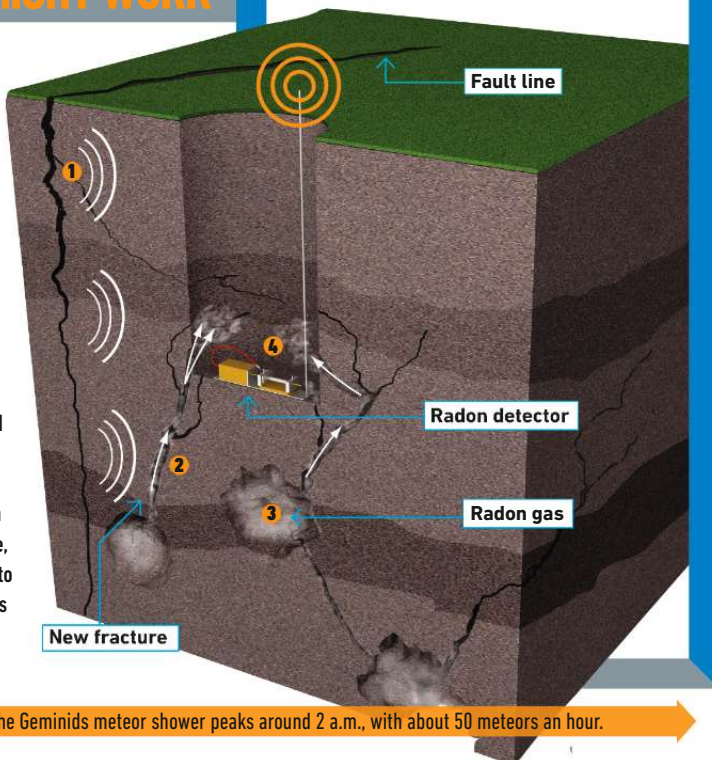
Earlier this year, Vladimir Peskov, a physicist from CERN Laboratory in Switzerland, unveiled the first radon detector inexpensive enough to install

by the hundreds. Standard scientific radon detectors inject air samples into a closed chamber of argon gas in an electric field. Radon decays into radioactive particles that alter the charge of the argon, and the detector reads this change to determine radon levels. This closed system eliminates other interactions from being read as radon, but it costs \$15,000. Peskov increased the gradient of the electric field in the chamber of his device, allowing it to identify subtler changes as air breezes through it. It costs \$60, he says, and it works as well as the more expensive models.

Peskov hopes to attract funding for placing detectors along active fault lines in Italy, starting as early as next year. If the theory works, the detectors could form the beginning of a permanent warning system.—MORGEN PECK

## HOW IT MIGHT WORK

Some scientists think that undetectable rumblings [1] precede a quake by as long as a few days. These movements would create fractures [2] in the dirt and rock underground, releasing radon gas [3] from pockets in the earth. Detectors [4] installed in wells would sense that sudden increase in radon, indicating an impending earthquake, and allow authorities to evacuate the area days before the disaster.



PAUL WOOTTON

DECEMBER 13-14 The Geminids meteor shower peaks around 2 a.m., with about 50 meteors an hour.

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# FORTUNE FAVORS THE GEEKY

Five contests that recognize science achievements of the everyman

There's a long tradition of offering big cash prizes to entice talented and creative individuals to solve problems that have stymied industry and governments for decades. For example, in 1810, French cook Nicolas Appert won a 12,000-franc government prize for a food preservation method to help feed Napoleon's army. His demonstration of putting food in airtight glass

jars and sterilizing them with heat led to canning techniques that are still used today. Recently, such contests have blossomed, with many geared toward particle physicists and backyard tinkerers alike. Each year now, innovators are awarded some 30,000 prizes, worth in total about \$1 billion. Here are our picks for the five most accessible.—REBECCA BOYLE



## POSTCODE LOTTERY GREEN CHALLENGE

Create a marketable, user-friendly technology to reduce greenhouse-gas emissions. To win the Dutch lottery's prize, your invention should be refined enough to implement within two years. Judges favor creativity, sustainability and entrepreneurship.



## N-PRIZE

Launch a satellite weighing between 0.35 and 0.70 ounces into low-Earth orbit by September 19, 2011. According to the prize's sponsor, biologist Paul Dear, the launch must cost less than \$1,600, and the satellite must circle the planet nine times.



## SIKORSKY HUMAN-POWERED HELICOPTER COMPETITION

Hover at least 9.8 feet off the ground for 60 seconds, using only human power and no energy-storage devices. The Sikorsky Aircraft and American Helicopter Society's contest rules stipulate that lighter-than-air gases such as helium are not allowed.



## WENDY SCHMIDT OIL CLEANUP X CHALLENGE

Clean up oil spills better than current methods, and without any negative environmental effects. Teams selected by the X Prize Foundation will compete head-to-head for the quickest and most efficient cleanup on a test spill next summer.



## ROLEX AWARDS FOR ENTERPRISE

Build a working prototype of a "world-changing technology." Categories include Science and Health, Environment, Exploration and Discovery, and Applied Technology. Representatives for the watch company judge entries on originality, impact and feasibility.

THE CHALLENGE

THE PAYOFF

THE COMPETITION

First place: about \$700,000; second: about \$275,000

One-shot launching system: about \$16,000; reusable one: about \$16,000

\$250,000 (and a serious cardio workout)

First place: \$1 million; second: \$300,000; third: \$100,000

First place: \$100,000 and a gold Rolex; runners-up: \$50,000 and a steel-and-gold Rolex

A 25-year-old engineer, Scot Frank, won this year for a portable solar concentrator. The runner-up, rainforest researcher Jason Aramburu, also 25, submitted a kiln for people in developing nations to turn waste into carbon-capturing charcoal. [greenchallenge.info](http://greenchallenge.info)

This prize is geared toward basement engineers around the world. The 26 teams that have signed up so far include both professional aerospace engineers and amateurs with no rocket-science background at all. [n-prize.com](http://n-prize.com)

Only two human-powered copters have ever flown. California State Polytechnic students hovered at eight inches for about eight seconds in 1989. A team from Nihon University in Japan set the current world record in 1994, at the same height for nearly 20 seconds. [vtol.org/awards/hph.html](http://vtol.org/awards/hph.html)

The X Prize Foundation hasn't yet announced teams, but the Deepwater Horizon disaster has already proved that great ideas can come from anyone, such as the oil-tanker captain who invented a mesh sieve that snags tar balls from the ocean. [iprizecleanoceans.org](http://iprizecleanoceans.org)

Past winning projects were an acoustic whale-detector to protect the animals from ships, and a stove powered by discarded rice husks. Winners have included academics, professionals, entrepreneurs and students. [rolexawards.com](http://rolexawards.com)

DECEMBER 21 Beginning at 12:29 a.m. EST, the moon passes through the Earth's shadow, making a full lunar eclipse visible throughout North America and much of the world.





# LED TVs MEET YOUR MATCH

INTRODUCING THE NEW LEDP75

THE WORLD'S ONLY FULL MOTION MOUNT SPECIFICALLY DESIGNED FOR LED TVs

PROPRIETARY DUAL-MODE INSTALLATION™  
FOR LOW PROFILE ON-WALL MOUNTING  
OR FLUSH IN-WALL MOUNTING



On-Wall

In-Wall

Ultra thin. Packed with innovation. Stunning looks. We're not just talking about LED TVs - we're talking about the LEDP75. No other mount has so much style or substance. Exclusive features like Dual-Mode Installation™, ArmGlide™ for exact panel placement and an ultra slim mounting profile truly set this mount apart. Engineered from extruded aluminum with a brushed and anodized finish, it is certainly worthy of today's sleeker LED panels. Also compatible with LCD, Plasma and 3D. Want to see it in all its glory? Visit [omnimount.com](http://omnimount.com).







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Only one vehicle has made Car and Driver's 10Best® list a record 24 times...and counting.  
Presenting the one. **The forever-efficient Accord. From Honda.***



\*23 city/34 highway mpg. Based on 2011 EPA mileage estimates for Accord 4-cyl. Sedan models with AT. Use for comparison purposes only. Actual mileage will vary. †Car and Driver, January 2010. © 2010 American Honda Motor Co., Inc.

**Accord**



# BEST OF WHAT'S NEW 2010

Our December issue is **more** than just an **exhaustive guide** to the greatest creations of the year. **It's a forecast.** For **23 years**, the Best of What's New awards have gone to the **100 innovations** that indicate where **technology** is headed in **the future**. Turn the page to see what **revolution** looks like.

- 31 GREEN TECHNOLOGY
- 37 AUTOMOTIVE
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- 53 HEALTH
- 59 AVIATION & SPACE
- 65 HOME ENTERTAINMENT
- 71 SECURITY
- 75 COMPUTING
- 79 HOME TECHNOLOGY
- 85 RECREATION



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With the new **Lifestyle<sup>®</sup> V35** system, our best surround sound brings your movies, sports, video games and music to life. You also enjoy dramatically easier setup and use – with clear onscreen messages and a single, family-friendly remote. Bose is known for making home cinema thrilling. Now see how much easier it can be to enjoy.

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**LIFESTYLE<sup>®</sup> V35** home entertainment system.

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BEST OF WHAT'S NEW 2010

GREEN TECH

INNOVATION OF THE YEAR

GREEN  
TECHNOLOGY  
**GRAND  
AWARD**  
WINNER

2010

BRIAN KLUTCH

AQUAPRO HOLLAND GROASIS WATERBOXX

## The Best Way to Hug a Tree

**Deforestation and overfarming** have helped decrease the productivity of about 70 percent of the world's arid and semi-arid lands, which could force the migration of 50 million people by 2017. Our innovation of the year, the Groasis Waterboxx, an irrigation-free plant incubator, could help make these lands fertile again. And it's nothing more than an exceptionally well-designed bucket.

Drylands actually have enough water to sustain trees for decades, but it's several feet beneath the surface. Because rain and irrigation evaporate quickly, many young plants die before their roots can tap that reservoir. The Waterboxx, shaped more like a doughnut than a box, helps plants survive long enough to make it through that layer of dry soil. Place the tub around a freshly planted seedling, and fill the evaporation-proof basin—just once—with four gallons of water. The

Waterboxx does the rest. At night, its top cools faster than the air, collecting condensation to supplement those initial gallons. The tub drips about three tablespoons of water a day into the soil, sustaining the plant while encouraging its roots to grow deeper in search of more water. Once the plant reaches the moist soil layer, usually after a year, the farmer lifts the box off the plant and reuses it on the next sapling. Each Waterboxx is expected to last 10 years, and, for about a buck or two per tree grown, is cheap enough to use in poor nations.

In tests in the Sahara, 88 percent of Waterboxx-sheltered trees survived, versus 10 percent of trees with traditional cultivation. But the mighty tub's inventor, Pieter Hoff, still isn't satisfied. He's working on a biodegradable version that decomposes to feed the plant too. **\$275/10 boxes; [groasis.com](http://groasis.com)**



PHILIPS  
ENDURALEDA More  
Efficient  
Lightbulb

**Remember when** everyone was supposed to ditch standard incandescent lightbulbs for more-efficient compact fluorescents? Philips's EnduraLED bulb could replace both. It's the first LED bulb that can compete head-to-head (and lamp-to-lamp) with a 60-watt incandescent, the most common household light. Because LEDs lose less energy than incandescents as waste heat, the bulb produces the same amount of light as a 60-watt incandescent using just 12 watts. The EnduraLED's yellow phosphor coating filters the LEDs' bluish wavelengths to produce a consistently warm, white glow. The bulb lasts approximately 25 times as long as an incandescent, while its energy savings covers the hefty price tag in about four years. And its efficiency is similar to compact fluorescent lights, but without the mercury. **\$40 (est.);** [lighting.philips.com](http://lighting.philips.com)

## AMEE EXPLORER

The Smartest  
Carbon Calculator

**Three years ago**, AMEE, a carbon-data company, made a sophisticated but impenetrable programming tool aggregating thousands of previously incompatible data sources and environmental models from governments, utilities and more. It's the best CO<sub>2</sub>-emissions science around. Now AMEE has added the free, user-friendly Web site Explorer, which lets laymen use the info. Plugging in simple search terms, people can find calculators for, say, the carbon footprint of driving 12,000 miles in a Ford Fusion. It's a curiosity at the moment, but if a true carbon economy emerges—when all CO<sub>2</sub> is capped, traded, and commodified, and your car and even your washing machine is reporting its kilowatt-hours—AMEE's programs will be your way to find the true value of what you own. [explorer.amee.com](http://explorer.amee.com)

## NEAH POWER INFINITY EL

A Lighter,  
Greener Battery

**Neah Power's** direct-methanol fuel cells are lighter than batteries and less expensive than other fuel cells. Its novel silicon-based electrode has 40 times as much surface area as most fuel cells, producing more charge while using less platinum catalyst. This fall, Neah introduced Infinity eL, its demo product line. The company usually tailors its tech to specific applications—for example, a 45-watt cell that can double a three-foot-wide unmanned aerial vehicle's flying time, without adding weight. Neah cells could soon replace other portable products, including electric-car and laptop batteries. [neahpower.com](http://neahpower.com)

## ECOATM

The Easiest  
Cellphone Recycler

**Only 3 percent** of cellphones worldwide get recycled; the rest end up leaking toxic metals into landfills. Now ecoATM has the first phone-recycling kiosk, which gobbles up phones and spits out an incentive to recycle: money. To identify the phone's model, it visually scans the phone's exterior and compares the images with an ecoATM-maintained database of 4,000-plus mint-condition handsets. Then you hook up your phone to the appropriate cable, and it tests the phone's electronics and looks for cracked LCDs and cosmetic damage. The kiosk offers to erase your data and gives you cash based on the phone's value for resale. The first 10 ecoATMs, which hit electronics stores, malls and college campuses last winter, have already recycled 33,000 phones, at an average payout of \$9 per handset. The company plans to roll out 500 more kiosks next year and expand to more types of portable electronics.

[ecoatm.com](http://ecoatm.com)



## CALERA

Hardest-Working  
Carbon Scrubber

**Coal and natural-gas** power plants are one of the largest man-made sources of carbon dioxide. But by paying to build a Calera facility next door, a plant can trap that smokestack carbon while producing and selling construction materials. Calera's process combines the CO<sub>2</sub> with calcium from underground brine or seawater to produce calcium carbonate, which can act as a cement. Calera has had a demonstration plant running since 2009 and this year started planning its first commercial facility, which should sequester about 70 percent of the coal plant's CO<sub>2</sub> emissions. [calera.com](http://calera.com)



# CEMENT FROM THIN AIR

## A BIOLOGIST'S PLAN FOR RADICALLY REDUCING CARBON EMISSIONS

### AS A MARINE-BIOLOGY

student in the 1980s, Brent Constantz was astonished to discover how simply corals conjure their stony mass from nothing more than seawater. The trick? They combine the calcium and bicarbonate already present in seawater into calcium carbonate, which crystallizes into a durable exoskeleton. Constantz spent the next two decades thinking about how to apply a similar trick to patching human bones, took out more than 60 patents, started two companies, and now his bone cement is in use around the world.

But he also continued thinking about coral, and in 2007 that led him to an ingenious insight about another form of cement—the kind that goes into buildings. Like coral, limestone cement also crystallizes in water. Add an aggregate to the mix, such as sand or gravel, and the result is cheap and durable concrete. But making cement requires heating limestone to about 2,600°F, which causes the limestone to release carbon dioxide. The result, reports the U.S.

### PopSci PROFILE Brent Constantz

Department of Energy, is that cement production has become the “largest source of U.S. carbon dioxide emissions other than fossil fuel consumption.” And demand is growing rapidly, especially in the developing world. In China, for instance, some 15 million people move from the country to the city every year, and construction must keep pace.

Constantz realized that cement manufacturers, by emulating coral, could meet that demand even as they actually reduced the total amount of carbon dioxide released into the atmosphere.

Moreover, they could sequester the raw materials from the world's single largest carbon-dioxide emitter, electric power plants. In 2009 his latest company, Calera, started putting

that insight into practice at a 1,000-megawatt power plant in Moss Landing, California. Engineers there spray mineral-rich seawater or brine water through flue gas captured from the plant's smokestacks. The calcium in the water bonds with carbon in the would-be pollution to form cement. Constantz says the demonstration plant is capable of producing up to 1,100 tons of cement a day and, in doing so, sequestering 550 tons of carbon dioxide. Within three years, he says, Calera will be operating plants in Australia and Wyoming.

Constantz notes as well that, unlike other sequestration schemes, his plan for capturing carbon emissions is proven. For at least 600 million years, sea creatures have been “sequestering” carbon dioxide in their skeletons, which have compacted over time to form all the limestone on Earth—the very stuff we now heat to make cement. Instead of turning stone to carbon dioxide, we can turn carbon dioxide into “stone,” locking it away forever in the concrete foundations of our cities. “When we think of climate change,” Constantz says, “the main lever we have is putting carbon back in the geologic record.”—BENJAMIN PHELAN

**STRONG MIX** Brent Constantz is building cement plants that reduce pollution.

“THE MAIN LEVER WE HAVE IS PUTTING CARBON BACK IN THE GEOLOGIC RECORD.”





# BEHIND EVERY GREAT SHOT IS A GREAT LENS

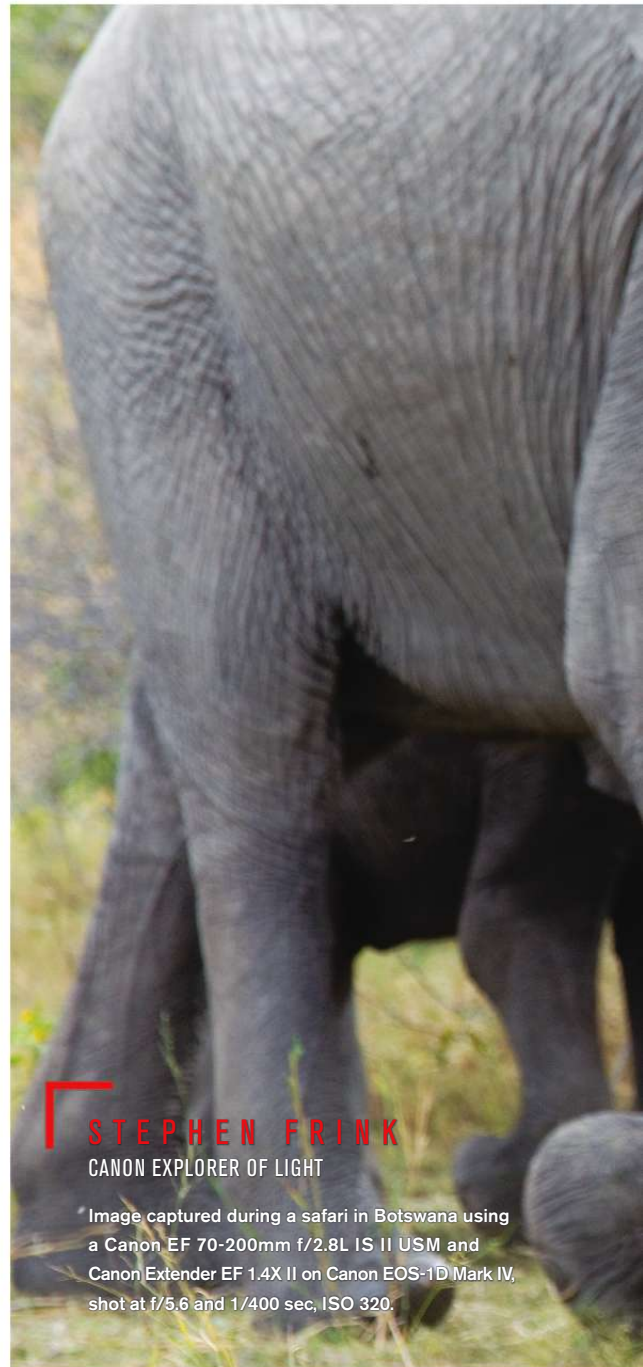
Wildlife photography is one of the most demanding specialties on the planet, requiring incredible patience, precision and dedication. It also demands long-range telephoto zoom lenses of exceptional quality that deliver the ultimate in speed, ruggedness, responsiveness and real-world imaging performance. Perhaps the finest example in current production is the new Canon EF 70-200mm f/2.8L IS II USM that veteran wildlife shooter Stephen Frink used to capture this outstanding image of an African elephant. This optical masterpiece combines Canon's most advanced image stabilization (IS) technology and cutting-edge optical design, made with the finest materials to achieve breathtaking flare-free image quality over its entire range. It's also resistant to moisture and dust, ensuring enhanced reliability in the most challenging environments.

Built into the EF 70-200mm f/2.8L II USM is Canon's brilliant new extended-range IS system that delivers up to four stops of anti-shake correction, providing a crucial edge for wildlife photographers who often shoot at long telephoto settings. It achieves spectacular definition, contrast and color correction by incorporating high-performance fluorite crystal plus 5 ultra-low-dispersion (UD) glass elements, and state-of-the-art multi-coating. It focuses down to 3.9 feet at all focal lengths, a big plus for capturing stunning close-ups, and its constant maximum aperture of f/2.8 is a superb asset for shooting natural-looking pictures in low light. We commend Stephen Frink's impressive talent and congratulate him on his masterful shot, but what also made it possible was a great lens—one that establishes a new class standard for shooting flexibility and real-world picture-taking performance.

## KEY SPECS



- Focal Length & Max. Aperture: 70-200mm, f/2.8 constant
- Diagonal Angle of View: 34 degrees (70mm) to 12 degrees (200mm) for full-frame (24x36mm) format.
- Focus Adjustment: Internal focusing system; USM silent drive. Full-time manual focusing available at any time.
- Closest focusing distance: 3.9 feet (1.2m).
- Maximum magnification ratio: 0.21X at 200mm setting.
- Filter size: 77mm
- Maximum Diameter x Length: 3.5 x 7.8 inches (88.8 x 199mm)
- Weight: 3.3lb (1,490g)
- Included: Lens Cap, Pouch Case, Lens Hood ET-87



**STEPHEN FRINK**  
CANON EXPLORER OF LIGHT

Image captured during a safari in Botswana using a Canon EF 70-200mm f/2.8L IS II USM and Canon Extender EF 1.4X II on Canon EOS-1D Mark IV, shot at f/5.6 and 1/400 sec, ISO 320.

FOR MORE INFORMATION, VISIT [USA.CANON.COM](http://USA.CANON.COM)

True PDF release: storemags & fantamag





Stephen Frink is a compensated spokesperson and actual user of the Canon products he promotes.

**Canon**



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Go the distance with MICHELIN® HydroEdge® tires. MICHELIN HydroEdge tires last up to 33,000 miles longer than the leading competitor,<sup>1</sup> saving you money by replacing your tires less often. In addition, the MICHELIN HydroEdge tire stops up to 14 feet shorter in wet conditions than the leading competitor<sup>2</sup> and is the most fuel efficient tire in the category.<sup>3</sup> See how the right tire changes everything at [michelinman.com/lastlonger](http://michelinman.com/lastlonger).



1- Based on commissioned third-party wear test results versus the Goodyear® Assurance® TripleTred™ and Assurance® ComforTred®  
2- Based on third-party wet braking test results versus the Goodyear® Assurance® ComforTred® product line in wet testing. 3- Comparisons based upon fuel efficiency testing between MICHELIN® HydroEdge® tires, Goodyear® Assurance® TripleTred™ tires, Goodyear® Assurance® ComforTred® tires, and Bridgestone® Turanza® EL400 tires. Fuel savings are estimates based on comparative rolling resistance. Actual on-road savings may vary. Based on comparisons against the leading competitors in the standard S/T-rated all-season category. Copyright ©2010 Michelin North America, Inc. All rights reserved.



BEST OF WHAT'S NEW 2010

AUTOMOTIVE

AUTOMOTIVE  
**GRAND  
AWARD**

WINNER

2010



COURTESY PORSCHE CARS NORTH AMERICA

**PORSCHE 918 SPYDER****The Ultimate Green Supercar**

**The future of the car** will be electrified, and the Porsche 918 Spyder concept shows just how much fun it will be. In this mid-engine supercar's current configuration, a 3.4-liter racing V8 shares propulsion duty with three electric motors that produce a combined 218 horsepower. Together, all four powerplants create 718 horsepower and catapult the Spyder from 0 to 60 in 3.2 seconds, with a top speed of 198 mph—but if you don't floor it, the Porsche can deliver up to 78 mpg. In E-Drive mode, the electric motors alone propel the vehicle. Three different hybrid modes

allow you to choose between varying degrees of efficiency and performance. In the unlikely event you need more power, the "E Boost" button will send a seven-second blast of current to the electric motors. Nearly 2,000 people have already signed letters of intent to buy a Spyder, and the automaker is developing it for sale, though it's not clear when the estimated half-million-dollar car will appear on streets. In the meantime, the Spyder is already serving as a testbed for technology that will trickle down to the rest of us. **Price not set; [porsche.com](http://porsche.com)**





## FIAT MULTI AIR

### Advanced Fuel Efficiency for the Masses

**Conventional internal** combustion engines waste about 10 percent of their potential power through “pumping losses” caused by the throttle plate that regulates and restricts airflow into cylinders. In 2001, BMW’s Valvetronic system reduced those losses using electronically controlled intake valves. But the BMW system is complex and expensive. Now Fiat’s MultiAir engines will deliver a similar edge in fuel consumption and carbon-dioxide emissions with a simpler, more affordable design that makes minute adjustments to the intake valve. The system is inexpensive enough that it will soon power millions of cars from Fiat and its partner, Chrysler. MultiAir rolls out with the Fiat 500, which comes to the U.S. early next year. [fiat.com](http://fiat.com)

## 2011 FERRARI 458 ITALIA

### The Driver-Friendly Ferrari

**The Ferrari 458 Italia** isn’t just a voluptuous, 202mph beauty that burns from 0 to 60 in just 3.2 seconds. Yes, it’s the company’s most technically sophisticated sports car. The shrieking V8 at the car’s center produces 562 horsepower and 398 pound-feet of torque from just 4.5 liters of displacement—both industry records in power-per-liter for a car without a turbo- or supercharger. But the 458 is also user-friendly. Inside, the steering-wheel-mounted *manettino* lever offers a range of driver-selectable settings to adjust the car’s traction and stability systems (derived from the company’s F-1 vehicles), its magnetic-fluid shock absorbers, and its paddle-shifted, dual-clutch automated manual transmission, which lets drivers fire off shifts like Michael Schumacher himself. The result is a car that comes out of turns 32 percent faster than the Ferrari F430. Earlier this year Ferrari had to recall the 2010 458s to replace a faulty panel sealant that caused a few cars to catch fire. But the fix was simple and quickly implemented, and it doesn’t change the fact that this car can match the legendary \$652,000 Ferrari Enzo supercar around the company’s track in Fiorano, at one third of the Enzo’s price. **\$230,000; [ferrari.com](http://ferrari.com)**



## 2010 MOTOCZYSZ E1PC

### The Fastest Track-Worthy Electric Motorcycle

**This year, a tiny Oregon company** built an electric motorcycle, the 2010 MotoCzysz E1PC, and in June it beat every battery-powered rival in cycling’s most death-defying challenge: the Isle of Man Tourist Trophy race. Powered by a 134-horsepower oil-cooled electric motor and a 12.5-kilowatt-hour lithium-polymer battery pack, the E1PC reached a top speed of 135 mph on the

island’s mountainous road course, completing its 37.7-mile lap in just over 23 minutes. As with any electric vehicle, limited driving range is a problem; the MotoCzysz battery held enough of a charge to tear up one lap, but it probably couldn’t have done another. Still, company founder Michael Czysz says the prototype bike can manage 100 miles in less-stressful conditions. [motoczysz.com](http://motoczysz.com)



**HIGH VOLTAGE** The record-setting E1PC

CLOCKWISE FROM TOP: COURTESY FIAT; COURTESY FERRARI S.P.A./FERRARI NORTH AMERICA; COURTESY ACP/JOSE CASTRO





**SEXY BEAST** The 458 Italia is, among other things, the most attractive Ferrari in years.

## 2011 FORD FIESTA

### Detroit's First Great Small Car



**This little Ford represents** something big. The Fiesta is the anti-Pinto—the kind of well-engineered, sporty yet frugal small car that Detroit has historically refused to build. Available as a sedan or a five-door hatchback, the 2011 Fiesta gets 120 horsepower from a 1.6-liter four-cylinder engine, good for a reasonably brisk 9.3-second run to 60 mph. The steering is quick, the suspension frisky. Inside, the Fiesta's amenities, including Ford's voice-activated Sync system, easily surpass what you'll find in other cars in its class. An available six-speed, dual-clutch automatic transmission is technology usually limited to pricey luxury cars. And that engine and transmission combine for Toyota-smoking mileage: 29 mpg in the city and 40 mpg on the highway. Aside from the two-seat, snail-paced Smart, the Fiesta is the only non-hybrid on the market to achieve 40 mpg. **From \$14,000; [ford.com](http://ford.com)**

## FORD INFLATABLE SEATBELT

### Injury-Free Seatbelts

**Seatbelts** can cause bruises, fractured ribs and other injuries. Starting with the 2011 Explorer, Ford will be the first automaker to bring to market inflatable seatbelts, designed to reduce head, neck and chest injuries to passengers

in the rear seat, where the most vulnerable people—children and the elderly—tend to sit. In a severe collision, the bags inflate within 40 milliseconds, distributing crash forces across five times as much of the body as a conventional seatbelt. **Price not set; [ford.com](http://ford.com)**



## 2011 HYUNDAI SONATA 2.0T

### More Power, Less Engine

With the **Sonata 2.0T**, Hyundai demolishes the notion that high fuel economy entails low performance. By pairing twin-scroll turbochargers (which reach peak performance quicker than a conventional charger) with a sophisticated direct-fuel-injection system, the 2.0T wrings 274 horsepower out of a relatively small 2.4-liter, four-cylinder engine—more total horsepower than any V6 in its class. Yet the Hyundai also ekes out 33 highway mpg. **From \$24,865; [hyundaiusa.com](http://hyundaiusa.com)**

## 2011 CHEVROLET VOLT

### An Entirely New Kind of Car



When the **Chevrolet Volt** exited the assembly line in November, it became the first and only production plug-in hybrid on the American road. GM says the four-passenger hatchback's power train will allow 78 percent of American drivers to forgo gasoline entirely during their daily commutes. Unlike the purely electric Nissan Leaf, which can travel roughly 100 miles before halting for a recharge, the Volt can travel coast-

to-coast—a full charge of the battery is good for 25 to 50 miles of driving; after that, the gas engine starts up and generates electricity for the battery. The engine adds another 310 miles of range, and you can gas up as needed until you get a chance to plug in, while still getting mileage in the mid-to-high 30s. **From \$41,000, or \$33,500 after \$7,500 federal tax credit; [chevrolet.com](http://chevrolet.com)**

## VOLVO PEDESTRIAN DETECTION

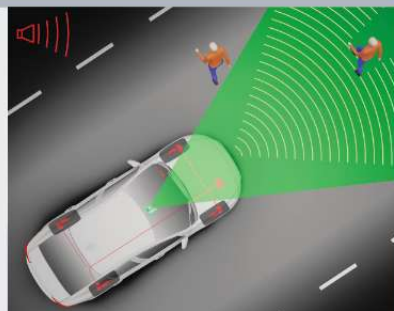


**EYES ON THE ROAD** The Volvo S60's camera-computer combo can detect pedestrians against a crowded city backdrop.

### Smartest Safety Feature

**Volvo's 2011 S60** will include as an option the company's latest lifesaving gadget, Pedestrian Detection, which can spot people at up to 160 feet and brake to avoid a collision. When a bumper-mounted radar detects what might be a pedestrian, a camera mounted near the rearview mirror snaps a shot, and an onboard computer compares the photo against a database of 10,000 images in search of telling details—a walker's swinging arms, for example, or

his moving head. The S60 precharges its brakes, and if the driver fails to respond to an audible alert, the Volvo stops itself. Below 22 mph, the S60 can come to a complete stop before striking a pedestrian; at higher speeds, the vehicle's speed is sharply reduced. For now, the system has trouble spotting children and animals under 32 inches tall, but Volvo says it will improve the sensitivity so that eventually it will detect dogs, deer and others. **[volvocars.com](http://volvocars.com)**





**CAT POWER** The XJ's 510-horsepower supercharged V8 slings it from 0 to 60 in 4.7 seconds.



## 2011 JAGUAR XJ

# Most Elegant Monster

Once the symbol of upper-crust influence, the Jaguar XJ had over the decades declined as steadily as the British Empire. Now the XJ embodies Jaguar's unexpected renaissance as a lithe and ultra-modern alternative to the German luxury brands. With an aluminum chassis that weighs less than the steel underpinnings of the Mini Cooper, the 4,100- to 4,300-pound Jag—gorgeously rewrought by Ian Callum, the designer of the Aston Martin

DB7—is easily the lightest sedan in its class. Powerful engines, including 470- and 510-horsepower supercharged V8s, make it nearly as quick as vastly higher-priced competitors. In a dash from 0 to 150 mph, the 470-horsepower XJ is a mere second behind the 514-horsepower, \$88,475 Mercedes E63 AMG. Its four-wheel-disc brakes can also stop the car at 70 mph in just 159 feet. **\$73,575; jaguar.com**

## AUTONOMOUS AUDI TTS PIKES PEAK

# The Driverless Sports Car

Unlike previous self-piloted vehicles, “Shelley”—so nicknamed by its creators at Audi parent company Volkswagen's Electronics Research Laboratory, Stanford University's Dynamic Design Lab, and Oracle—is designed for speed. It navigates using a GPS system that pinpoints its location on pre-mapped roads to within an inch. So it can't dodge traffic, but that's not the point. Instead the goal is to max out velocity and traction, using wheel sensors, an accelerometer and a gyroscope to monitor the car's performance. On the Bonneville Salt Flats in Utah last year, Shelley reached a top speed of 135 mph, and this fall it successfully ran the Pikes Peak road course in Washington. **audi.com**



**ROBO RACER** “Shelley,” the pilotless Audi, is the fastest robot on the road.



**NX**  
100

# The Samsung NX100. With the lens that changes everything.



ISO

Aperture

Shutter Speed

White Balance



## Introducing the Samsung i-Function lenses.

A compact, interchangeable lens camera system, the Samsung NX100 will transform camera enthusiasts into experts. Just one push of a button on the i-Function lens lets you change settings instantly while previewing them in real time on the brilliant AMOLED screen.

Revolutionizing the way you take pictures. Another way Samsung is Dedicated to Wonder.



**SAMSUNG**



BEST OF WHAT'S NEW 2010

## GADGETS

BRIAN KLUTCH

APPLE IPAD

## The Top Tablet

**After years of companies** trying to cram a computer into a tablet—the resulting boxes have been too heavy, the software too sparse, the screen too small—Apple made what everyone wanted: a sleek device with a gorgeous screen and a dead-simple interface that makes you want to sit back and play. The trick? Rather than shrink a computer, enlarge a phone. By using the same multitouch gestures and App Store as the iPhone, Apple created an intimate gadget for updating your Facebook status, watching a movie, or reading a magazine. Making it look simple,

though, is complicated. The 9.7-inch high-definition screen is the best example yet of in-plane switching, in which liquid crystals are aligned to allow a wider viewing angle than regular LCDs, and its speedy one-gigahertz processor is still efficient enough to run for nearly nine hours on a single charge. Apple sold three million in the first 80 days (more than the iPod or iPhone); now companies are rushing LCD tablets to market. The iPad, something between phone and computer, is what we always hoped a gadget could be. **\$500–\$830; [apple.com](http://apple.com)**

GADGETS

GRAND  
AWARD

WINNER

2010



## HTC EVO 4G

## Fastest Phone

It has a big screen, a big camera and a powerful processor, but the big news is the HTC EVO is the first 4G phone in the U.S. That means it connects to a mobile-data network—in this case, Sprint's WiMAX—that's up to 10 times as fast as earlier 3G systems. Surfing the Web on 4G is almost no different than doing so at a desk. The HTC EVO can download a song in seconds instead of minutes, stream high-quality versions of YouTube videos, and bring up Web pages faster than any other phone. Sprint's 4G service currently covers 53 metro areas, with more on the way, and you needn't fear if you wander elsewhere: In addition to its 4G antennas, the EVO packs antennas for ordinary voice, 3G data and Wi-Fi, all carefully arranged inside so that they don't interfere with one another. **\$200 (with two-year contract); [sprint.com](http://sprint.com)**

**LEAN BACK** The EVO's kickstand helps you enjoy those high-def streaming videos.



BRIAN KLUTCH

## POWERMAT WIRELESS CHARGING SYSTEM

## Simple Charging

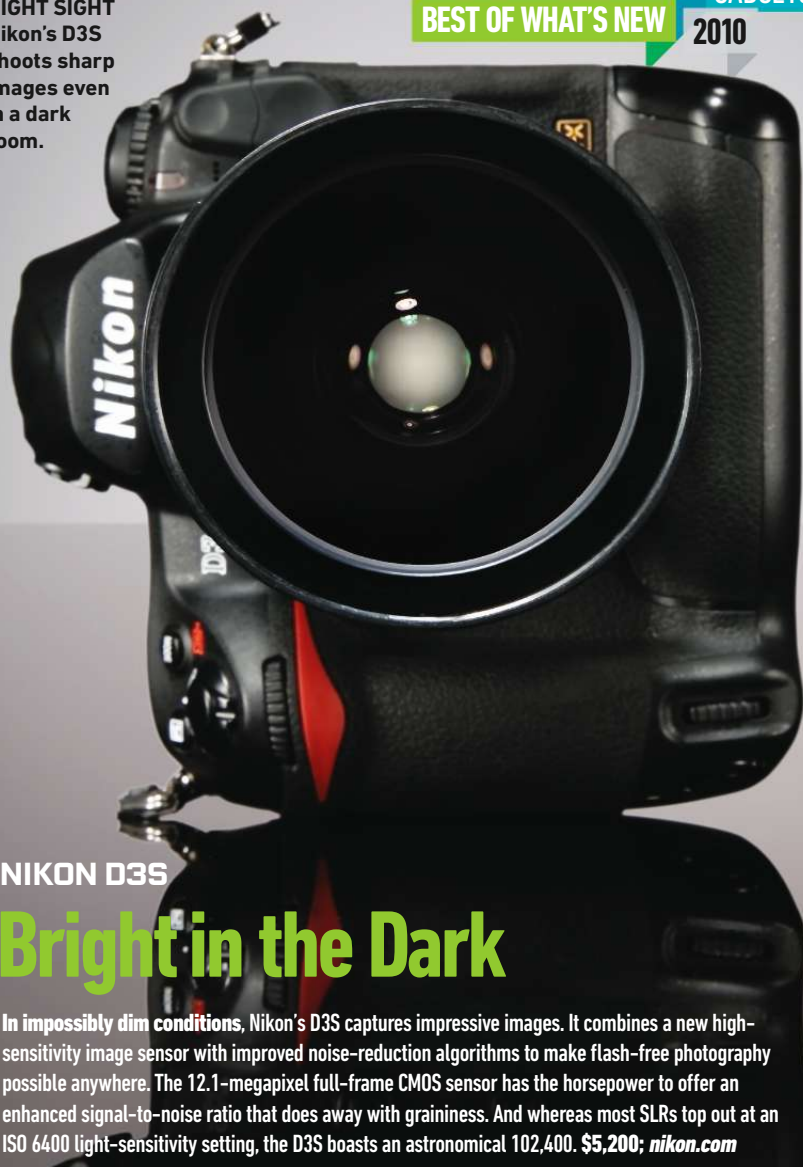
**This year, Powermat** delivered a practical way to charge gadgets without power cords. Electric toothbrushes have used the underlying magnetic-induction technology for years, but Powermat's system makes wireless charging widely practical. A charging pad accommodates multiple devices simultaneously, compact case adapters fit a wide variety of products, embedded radio-frequency chips communicate the device's power requirements, and magnets align the device and the pad with a satisfying tug. **Pad \$60–\$100; adapters \$20–\$40; [powermat.com](http://powermat.com)**





## BEST OF WHAT'S NEW

**NIGHT SIGHT**  
Nikon's D3S  
shoots sharp  
images even  
in a dark  
room.



NIKON D3S

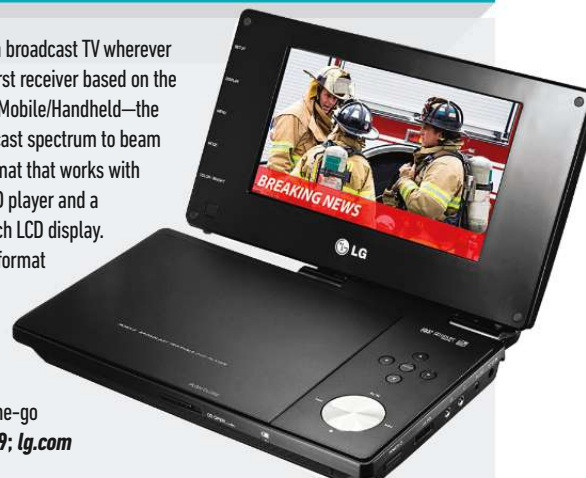
## Bright in the Dark

In impossibly dim conditions, Nikon's D3S captures impressive images. It combines a new high-sensitivity image sensor with improved noise-reduction algorithms to make flash-free photography possible anywhere. The 12.1-megapixel full-frame CMOS sensor has the horsepower to offer an enhanced signal-to-noise ratio that does away with graininess. And whereas most SLRs top out at an ISO 6400 light-sensitivity setting, the D3S boasts an astronomical 102,400. **\$5,200; [nikon.com](http://nikon.com)**

## LG MOBILE DIGITAL TV DP570MH

### Road-Ready TV

Exercise your inalienable right to watch broadcast TV wherever you want, because LG has delivered the first receiver based on the ATSC-M/H standard. The "M/H" stands for Mobile/Handheld—the system uses the existing digital TV broadcast spectrum to beam over-the-air digital programming in a format that works with portable receivers. The TV combines a DVD player and a portable ATSC-M/H tuner, with a seven-inch LCD display. Future implementations of the ATSC-M/H format will include cellphones that pick up TV programming without using cellular bandwidth, and a receiver in your laptop computer. Thanks to LG, even in the new world of Internet television, the best on-the-go programming may still be broadcast. **\$249; [lg.com](http://lg.com)**



**REST EASY** The Powermat can charge both a BlackBerry Bold and an iPod touch.





# Beauty in a Small Package

Olympus and Panasonic slimmed everything down when they created the Micro Four Thirds format, which tosses the space-hogging mirror box and allows for pocket-sized, lens-changing cameras. Now Sony has done even better. The company shrunk the body further, but not the image sensor. The NEX-5 has a new compact lens format, a miniaturized shutter drive and a smaller battery, but the same APS-C sensor found in most digital SLRs (about 60 percent larger than a Micro Four Thirds camera), avoiding the grainy images that occur when you squeeze too many megapixels onto a small sensor. **\$650–\$700; [sonystyle.com](http://sonystyle.com)**

## SD ASSOCIATION SDXC STANDARD

### Supersize Storage, Shrunk

**Secure Digital**, the format on your point-and-shoot's memory card, has been the standard since 2000. SDXC, the newest iteration, makes those cards capable of holding far more than your vacation photos. By ditching the antiquated FAT32 file structure and relying instead on Microsoft's exFAT architecture, SDXC is capable of holding up to

two terabytes on a single card—enough to capture 20 days of HD footage. The format also supports transfer rates as high as 104 megabytes per second, foretelling the end of hard-drive-based HD camcorders, and allowing manufacturers to someday replace hard-disk boot drives with SDXC cards in future mobile computers. **[sdcard.org](http://sdcard.org)**

## WI-FI ALLIANCE WI-FI DIRECT

### Your Gadgets Are Talking

**Anyone who has tried** to connect wireless devices has at some point been foiled by a flaky router, but Wi-Fi Direct does away with the router entirely. In the coming months, devices will be able to sync and connect to each other without one, enabling phones to stream HD content to connected televisions, PCs to send images to digital photo frames, and cameras to drive printers. Members of the Wi-Fi Alliance, including Apple, HTC, LG, Microsoft, Samsung and Sony Ericsson, plan to embed the software in future Wi-Fi-enabled devices. **[wi-fi.org](http://wi-fi.org)**

**ON THE FLY**  
The NEX-5's lenses offer DSLR-like versatility.





## VICON REVUE

# Your Life, Captured Automatically

The **Vicon Revue**, a wearable camera based on Microsoft SenseCam technology, takes typing out of status updates by creating an uploadable JPEG flipbook of day-to-day life. By default, it shoots once every 30 seconds, but five sensors make it smart enough to shoot as often as once per second when the action starts. When a dad high-fives his son at a baseball game, the accelerometer and compass feel him move, and the infrared eye sees the son; the cool, dim ice-cream parlor triggers shots of the post-game snack. \$790 (est.; import); [viconrevue.com](http://viconrevue.com)



**MACHINE VISION**  
The Revue's five sensors detect action and shoot it for you.

## E INK PEARL DISPLAY

# Sunny-Day E-Readers

**Apple established** a market for luxurious mobile entertainment with the iPad this year. But for those of us who just want to read text on a screen, e-readers have also evolved. This year, E Ink improved the chemistry of its display's pigment particles, resulting in a 50 percent greater contrast that makes beach reading even easier. The technology, called Pearl, was developed in partnership with chipset makers, meaning smaller, less expensive hardware can perform as well as costlier chipsets did in earlier devices. It may have been the year of the iPad, but Pearl brings the cost and legibility of e-readers closer to books than ever before. [eink.com](http://eink.com)

BRIAN KLUTCH

## BEST OF WHAT'S NEW 2010

# APPS OF THE YEAR

In our **23rd year** of selecting the most innovative products, it's time to consider a new category. Applications haven't replaced gadgets—after all, you can't have one without the other—but the year's best apps deserve recognition.

## GOOGLE GOGGLES

# What Am I Seeing?

A **text-based search** can tell you who's in a movie, but it can't identify who's in front of you. Now you only have to take a picture. Google Goggles analyzes the pixels of cameraphone images (it looks for such things as UPC codes, foreign text and the Mona Lisa's facial proportions) and returns results.

**Free;** [google.com/mobile/goggles](http://google.com/mobile/goggles)



## WIKITUDE WORLD BROWSER

# The New Reality

**Wikitude provides captions** for the world around you in real time. Available for Android, iOS and Symbian, it layers crowd-sourced information—landmarks, skate parks, Vietnamese food—onto the live view from your cameraphone. Wherever you are, boom, you're a local. **Free;** [wikitude.org](http://wikitude.org)



## SIRI PERSONAL ASSISTANT

# One App Shall Set You Free

**Siri's Personal Assistant** app uses natural language processing, individual preferences and personal context (location, time, history) to understand complex requests. Your voice commands prompt the software to reserve a nearby restaurant table, check flight prices, or call a cab. Say it, and it's done.

**Free;** [siri.com](http://siri.com)





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HTC EVO™ 4G: First 4G phone in the U.S. While supplies last. Phone requires a two-year Agreement and activation on a select service plan with Premium Data add-on. \*"85 of the Top 100 Sites Use Flash" Claim: Based on the following statistic from Adobe: "85 of the top 100 websites use Adobe Flash Player (Alexa)." Other Terms: Coverage is not available everywhere. The Nationwide Sprint Network reaches over 275 million people. The Sprint 4G Network reaches over 50 markets and counting, on select devices. The Sprint 3G Network reaches over 266 million people. See [sprint.com/4G](http://sprint.com/4G) for details. Not all services are available on 4G, and coverage may default to 3G/separate network where 4G is unavailable. Offers not available in all markets/retail locations or for all phones/networks. Pricing, offer terms, fees and features may vary for existing customers not eligible for upgrade. Other restrictions apply. See store or [sprint.com](http://sprint.com) for details. ©2010 Sprint. Sprint and the logo are trademarks of Sprint. The HTC logo and HTC EVO are trademarks of HTC Corporation. Adobe and Flash are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries. Other marks are the property of their respective owners.





BEST OF WHAT'S NEW 2010

## ENGINEERING

COURTESY NICK MERRICK/HEDRICH BLESSING/50M

## BURJ KHALIFA

## The Tallest Ever

**The 2,716.5-foot-tall Burj** is not merely “the world’s tallest building”; it’s taller than any other building by more than 1,000 feet. In structure, scale and sheer weight, the pride of Dubai is “a different animal,” says Skidmore Owings & Merrill engineer Bill Baker, who designed the beast with architect Adrian Smith. The engineering has the potential to transform the world’s skylines. Where the puny Willis (formerly Sears) Tower, for example, has a traditional relationship between height and girth (to make it taller, the footprint would have had to be to an unmanageable size), the Burj Khalifa can, because of its layout and core shape, rise without growing wider throughout its height. The tower’s floors wind upward in a series of setbacks around a central hexagonal core. That core is supported by one of three “legs” that form a sort of flattened tripod. The Burj is stronger for being heavier—the spire alone weighs 4,000 tons—and all that downward pressure helps keep it in place, while reinforced concrete maintains the structure’s stability. Not that the architects didn’t have to windproof the thing. They put models in a wind tunnel to measure vibrations from the powerful gusts that blow past the building’s upper floors and compensated as they went. It took a while. “Our first shape was not so good,” Baker says, “but like a musical instrument, you tune it.” [burjkhalifa.ae](http://burjkhalifa.ae)

ENGINEERING

GRAND  
AWARD

WINNER

2010



## Invincible Airport

Turkey's 1999 Kocaeli earthquake killed 17,000 people, thousands of them simply because they were in seismically unsound buildings. This year, the design firm Arup built Istanbul's airport—the emergency gateway in any future quake—to withstand an 8.0-magnitude earthquake (the Kocaeli was a 7.4). The building's resilience comes from 300 rubber-and-steel springs called seismic isolators, typically 12 to 60 inches long, that allow for horizontal movement

in the layer between ground and building. Each isolator's two curved plates, with a bearing in the middle, allows the structure to shift during an earthquake without cracking. The number of isolators, as well as the amount of testing—14 different earthquake scenarios tested the building in hundredth-of-a-second intervals—is unprecedented. Finished in an astonishing 18 months, the airport is the largest earthquake-ready structure in the world. [arup.com](http://arup.com)



### KOGOD CRADLE AT ARENA STAGE

## Noise Discipline

When the Arena Stage theater opened in 1961, the handful of flights in and out of nearby Ronald Reagan International Airport in Washington, D.C., weren't such a big deal. Today, there's a near-constant roar overhead. But exterior sound isn't the only challenge. Architect Bing Thom, brought in to rework the space and add a new "cradle" stage (for plays in development), decided to take the term literally, creating a rounded space that engulfs the audience. The result, however, was an acoustically difficult shape. Thom, with acoustical engineer Richard Talaske, dotted the theater with woven shapes that absorb sound. The spiraling hallway around the cradle lends sound isolation, as does the glass-and-timber layer that forms the building's exterior. Now the audience only experiences the sounds that it should. [arenastage.com](http://arenastage.com)

### ITALCEMENTI I.LIGHT

## Hardest Light

At the World Expo in Shanghai this year, the Italian pavilion was concrete, yet light passed right through it. Engineers and architects have talked about producing translucent concrete for generations, but until now the closest attempts only dotted the surface with points of translucency, like pixels in a low-res image. Think of Italcementi's material—cement and admixtures bonded to a transparent thermoplastic matrix that provides a consistent translucency—as high-resolution. It's cheaper, stronger and offers a wider visual angle than any competitor, and it means that even windowless concrete buildings could someday be daylight. [italcementigroup.com](http://italcementigroup.com)



### WIMBLEDON CENTRE COURT

## Tennis Weather, Always

The 60,000-square-foot retractable roof on top of Wimbledon's new Centre Court, created by the design firm Populous, means the end of rain-outs. The accordion-like fabric roof, which unfolds by way of nine 250-foot, court-spanning trusses, covers the open ground in seven minutes. The fabric, called Tenara, is tough enough to flex thousands of times, and it's 40 percent translucent. The court remains dry, but natural light still gives matches that outdoor feel. [populous.com](http://populous.com)

CLOCKWISE FROM TOP: COURTESY ARUP; COURTESY AELTC; COURTESY ITALCEMENTI



## VEER TOWERS

BEST OF WHAT'S NEW

ENGINEERING

2010

## Dramatic Angles

The wild slant of Las Vegas's Veer Towers, designed by Chicago architecture firm Murphy/Jahn, evokes the drunken revelers in the streets below. The towers lean an astounding 5 degrees (the Leaning Tower of Pisa tilts just 3.9). A core of slanted columns hands off the load at the sixth, 19th and 32nd floors as the floorplates shift more than 35 feet across the 37-story height of the building. The result is an impossible-looking structure and, because the towers lean past each other, views from every room. It's the year's boldest example of a true partnership between architect and engineer—what Jahn calls "archineering." [www.murphyjahn.com](http://www.murphyjahn.com)

## HELIOTRACE

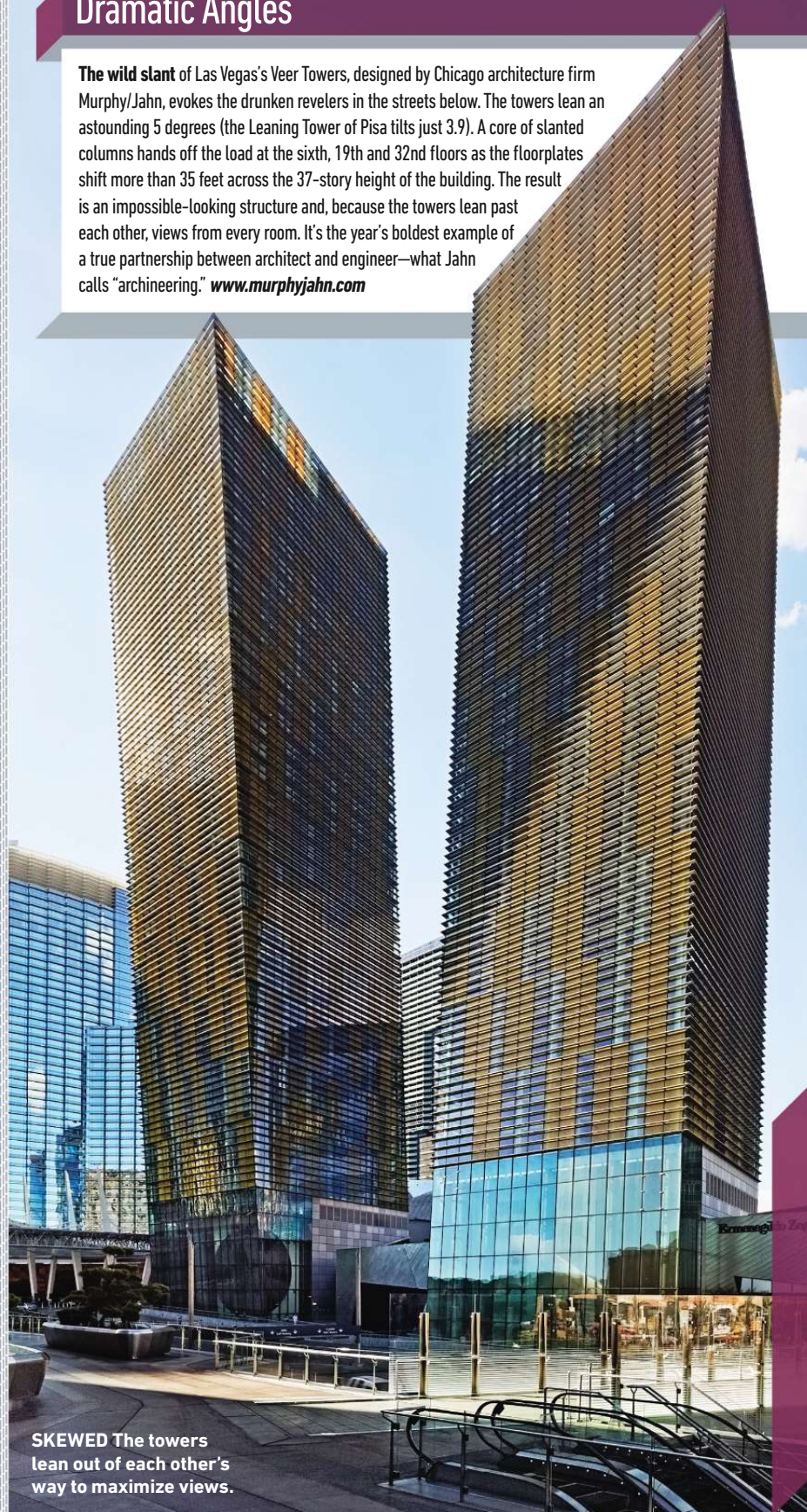
## Smartest Shade

Building designers often try to reduce the daytime use of electric lights with daylight, and air-conditioning with natural airflow, but doing so tends to introduce unwanted heat from direct sunlight. HelioTrace, a shade system designed by Skidmore Owings & Merrill, ensures the right balance of shade and sun. Moveable external sunshades block out the rays as needed, window frames withstand thermal change, and chilled ceiling panels circulate cold water to cool the space without air-conditioning. Architects can tailor the system to climate, sun path and operations schedules. [som.com](http://som.com)

**SUN BLOCK** HelioTrace's dynamic shade system can reduce the sun's effect inside a building by 81 percent.

**SKEWED** The towers lean out of each other's way to maximize views.

FROM LEFT: COURTESY RAINER VIERTLBOECK; SKIDMORE OWINGS & MERRILL (3)






THE SECRETS. THE LEGENDS. THE CURSE.



# MYSTERY OF THE HOPE DIAMOND

THE TRUE STORY OF THE WORLD'S MOST CELEBRATED JEWEL

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BEST OF WHAT'S NEW 2010

# HEALTH

## GE HEALTHCARE VSCAN

### Ultrasound Anywhere

**Trauma doctors** have a saying: Time is blood. The quicker a physician can identify an injury or disease, the better the patient's chances of survival. Ultrasound can show doctors a patient's beating heart or blood flowing through a kidney, and now the Vscan, just a bit larger than a smartphone, puts the tool in every doctor's lab coat. As a doctor glides the sound-wave-generating transducer wand over the patient, circuitry inside it combines overlapping echoes into images of organs or real-time blood flow and displays them on a handheld screen. The Vscan is already allowing emergency medics to assess internal injuries on the way to the hospital. And doctors can take a quick look at a person's heart murmur within minutes, rather than waiting hours or days for an appointment with an ultrasound technician. The Vscan could soon become as ubiquitous as the stethoscope. \$7,900; [gehealthcare.com](http://gehealthcare.com)





## ORASURE TECHNOLOGIES ORAQUICK HCV RAPID ANTIBODY TEST

### Fastest Hepatitis C Test

More than four million Americans are infected with the hepatitis C virus (HCV), but three million of them don't know it because testing is expensive and results take weeks. HCV is responsible for half of all liver transplants in the U.S. yet is curable if detected before it infects the liver. OraQuick delivers a diagnosis in 20 minutes. During your annual checkup, a doctor dips a strip coated with HCV proteins into a sample of your blood. If the blood contains HCV antibodies, a red line will form on the strip to indicate an infection. \$20; [orasure.com](http://orasure.com)

## VIKING SYSTEMS 3DHD VISION SYSTEM

### First 3-D Surgery

Surgeons routinely snake endoscopes through tiny incisions in patients to perform life-saving procedures. But using one is like operating with one eye closed—its single camera offers no depth perception. The Viking 3DHD endoscope carries two cameras to provide a “left eye/right eye” feed. A monitor projects both images, which the surgeon's 3-D eyewear combines into a single image with depth-of-field. Surgeons say the system makes it easier to dissect, grasp, and suture, and clinical trials show that it reduces surgery times by 38 percent. \$100,000; [vikingsystems.com](http://vikingsystems.com)

## EARLYSENSE EVERON

### Smartest Hospital Bed

The EverOn sensor puts an around-the-clock nurse near every hospital patient. Nurses typically check heart-rate and breath-analysis monitors of stable patients only every four hours, so a decline in health can go unnoticed in that time. Placed under a patient's mattress, the EverOn mat detects every heartbeat and breath, which it then transmits to a nurse's central computer so that worsening trends can be identified as they develop. Hospitals that tested the gear reported a 60 percent drop in patients who needed to be transferred to intensive care, and the average hospital stay dropped by half a day. \$7,000; [earlysense.com](http://earlysense.com)



## TOUCH BIONICS PRODIGITS

### Most Agile Prosthetic Fingers

Roboticians have built five-fingered prosthetic arms that can allow wearers to toss a ball, but the options for people with partial hand amputations are limited to crude spring-loaded digits. The ProDigits prosthesis offers fully functional individual fingers and thumbs to the 9,200 Americans each year who lose one or more fingers, and could eventually help the 1,700 babies born every year in the U.S. with partial hand loss. The breakthrough is miniaturization. Most full hand prosthetics stow the electronics and batteries in the palm, but because partial amputees still have their palm, Touch Bionics engineers redesigned everything to fit on the socket. Electrodes in the socket read muscle impulses to control the fingers. Adaptive programming adds functionality: Over time, patients can graduate from making a fist to typing. \$50,000–\$80,000; [touchbionics.com](http://touchbionics.com)



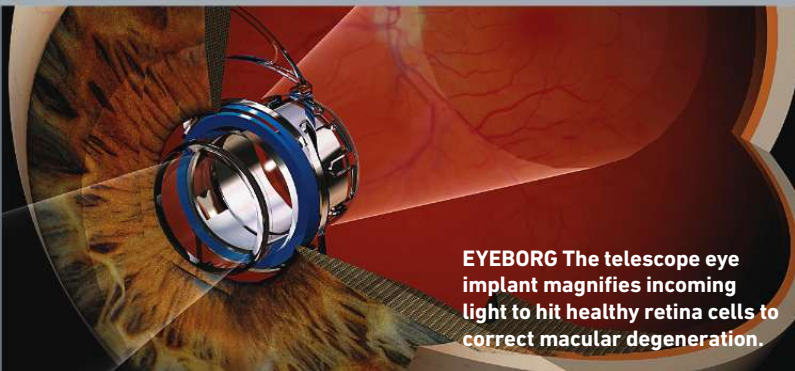
► THUMBS UP  
ProDigits can  
replace any  
combination  
of fingers.



## VISIONCARE OPHTHALMIC TECHNOLOGIES TELESCOPE IMPLANT

### Eyesight for the Blind

**Macular degeneration**, which kills the photoreceptors at the center of the retina, robs nearly a third of Americans older than 75 of their "straight-ahead" vision. With a quick outpatient procedure, this telescope eye implant restores this vision by spreading that light to healthy cells on the retina's perimeter. It takes a few days for the brain to adjust to the implant, but in clinical trials, three quarters of users saw their vision improve from "severe impairment" to "moderate impairment"—they could once again read, watch TV, and recognize faces. **\$15,000; [centrasight.com](http://centrasight.com)**



## BAUSCH & LOMB BIOTRUE

### First Sting-Free Contact-Lens Solution

The *Review of Optometry* reported in January that up to a third of new contact-lens users go back to glasses within a year because of discomfort. One of the biggest gripes was the burning sensation lens-cleaning solutions cause when they touch the eyes. Bausch & Lomb's answer is a liquid that's nearly identical to actual tears. Biotrue is the only solution that contains the natural eye lubricant hyaluronan. It's also the first solution to match a tear's pH, so it doesn't sting. And like tears, the formula doesn't disrupt the natural alignment of proteins in the eye, as other solutions do, which reduces both inflammatory response and the chance of infection. **\$15/two 10-ounce bottles; [biotrue.com](http://biotrue.com)**



## B2P MICROMAGIC MICROBE TEST

### The Quickest *E. Coli* Test

The best way to prevent a batch of *E. coli*-tainted spinach from causing an outbreak—a dangerously rising trend—is to test it at every point in the system, from the farm's water supply to the field to the grocery store. The problem is, today's reliable tests move too slowly for the fast-moving food-supply chain; testers must mail a sample to technicians, who take up to 72 hours to process it. The Thermos-size MicroMagic device lets inspectors check for *E. coli* on-site and at every stage of food production and preparation, and it produces results in 45 minutes to 10 hours. B2P says it will launch additional tests next year for listeria, salmonella and other bacteria. **\$4,000/tester, \$25/test unit; [b2ptesting.com](http://b2ptesting.com)**





## DENDREON PROVENGE

## The First Personalized Cancer Vaccine

**The Provenge** prostate-cancer treatment uses a patient's own immune system to kill tumors. Doctors extract immune cells called antigen-presenting cells (APC) from a patient's blood and, in a lab, expose them to prostatic acid phosphatase (PAP), a molecule that only prostate-cancer cells produce. Injected back into the patient, the modified APCs seek out any cells that express PAP and instruct the patient's immune system to kill the cancer cells. Clinical trials of terminally ill patients for whom no other treatments have been effective have shown that Provenge can extend life by four months on average, and up to three years in some cases. Scientists at Dendreon and elsewhere are working to apply the technique to other types of cancer. **\$93,000; *provenge.com***

## MOBILEGS

## Most Comfortable Crutch

Standard crutches are hard on the body and haven't changed much over the course of history. The last major innovation was revising the basic "T" shape to the now ubiquitous adjustable A-frame—and that was during World War II. Mobilegs takes the design to the 21st century with modern materials and careful attention to ergonomic factors (which should

come as no surprise given that their inventor helped design the Aeron chair). The new design provides better stability and reduces the type of secondary injuries—like nerve damage and wrist strain—associated with its predecessors. Better still, the lightweight crutches cost the same as the standard set. **\$60–\$90; *mobilegs.com***

▼ **WARM WELCOME**  
The Alair electrode heats constrictive lung tissue to provide asthma relief.

## ASTHMATX ALAIR BRONCHIAL THERMOPLASTY SYSTEM

## Breathe Easy

**The smooth muscle** that lines the lung's airways, like the appendix, serves no function. When it contracts, it can pinch off airflow and cause asthma attacks. Unlike the appendix, smooth muscle can't be removed. But doctors can now relax it permanently, and offer relief to two million Americans for whom no medication can stop frequent asthma attacks. The Alair Bronchial Thermoablation System consists of an electrode catheter connected to a controller unit. A respiratory specialist inserts the electrode and zaps the muscle with a small electric current. The heat from the shock permanently relaxes the muscle to open the airway. In trials, the Alair treatment cut asthma attacks by 32 percent and hospitalizations for respiratory complications by 73 percent. It has even allowed some asthmatics who couldn't previously jog more than a few blocks to run marathons. **\$30,000; *btforasthma.com***



**LEAN MACHINE** Designer Jeff Weber offers the first major crutch fix since World War II.

JOHN B. CARNETT

## POPSCI PROFILE JEFF WEBER

# A LEG UP

## FOR A CRUTCH INVENTOR, INJURY IS THE MOTHER OF INVENTION

**IN THE SUMMER** of 2005, Jeff Weber took a fall in the backyard of his Minnesota home, broke his heel, and was sentenced to 13 weeks on crutches. With little to do but hobble around and think, he quickly noticed the flaws in his new accessories: the way the hard “pads” compressed the soft tissue of his armpit, the way the rail-straight columns forced nerve-stressing bad posture, the way the perpendicular grips required a constant awkward twisting of his wrists. “It was pretty quickly introducing secondary trauma,” he says. “People are not constructed to walk on their arms.”

Unlike most of the millions of Americans who end up on crutches every year, however, Weber is a professional industrial designer. He apprenticed with Bill Stumpf on Herman Miller’s Aeron chair, which set a new standard for deploying contemporary materials and research methods into the design of everyday items, and then raised that standard when he became Stumpf’s partner on the follow-up Embody chair.

So rather than acquiesce to a rotten design, Weber began sketching.

His new crutch would employ an articulated mesh saddle that remained parallel to the armpit even as the angle of the column changed with the gait of the user. The column itself would curve away from the hip, so walkers could avoid angling the crutches outward into a chest-pincering pyramid. The grips would be shaped individually for each hand. (“For some reason we have ‘handed’ shoes, but not crutches,” Weber notes.) The feet would be rounded, so they could roll forward with each step. And the entire structure would use only 58 percent as much aluminum as regular crutches, making them far lighter.

The new crutches would also look a lot cooler—a crucial design element. “You can strike an intimate relationship with an object,” Weber says, but people “tend to

feel that they lose their dignity” when they must use ugly objects, and they use those objects less as a result.

The design of crutches hasn’t changed since, well, nearly ever—Weber notes that standard crutches are little more than repurposed tree limbs—and with 10 million pairs sold last year, his new design presents a sizeable business opportunity. At first, fearing copycats, Weber used his prototypes only at home. Now he has a partner (John White, a Minneapolis entrepreneur), a company (Mobi LLC) and 100 or so dealers. He is also working on updates to the traditional cane and walker, but he says the ultimate success will be if his designs actually *do* see less use. “Mobility is the key to good health,” he says. “If you’re mobile, you’re going to recover that much quicker.”—BRIAN GALLAGHER

“PEOPLE ARE NOT CONSTRUCTED TO WALK ON THEIR ARMS.”



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BEST OF WHAT'S NEW 2010

# AVIATION & SPACE



COURTESY SOLAR IMPULSE/STEPHANE GROS

## SOLAR IMPULSE HB-SIA

### A Clean-Aviation Milestone

**Zero-emission flight** leapt forward in July, when Swiss pilot André Borschberg flew the solar- and battery-powered Solar Impulse HB-SIA for 26 hours, 9 minutes and 10 seconds, reaching a height of 28,500 feet before gliding back down and marking the first time any aircraft had flown overnight on energy collected during the day [see page 63 for more on Borschberg]. Made largely of carbon fiber, the HB-SIA weighs 3,500 pounds, roughly the same as a midsize sedan. The plane's 208-foot wingspan and its horizontal tail stabilizer are

## AVIATION & SPACE

# GRAND AWARD

## WINNER

# 2010

covered with 11,628 solar cells that supply electricity to its onboard electronics, four 10-horsepower electric motors and lithium-polymer battery packs. The battery packs take over from the solar panels approximately two hours before dusk, when the sun's rays become too weak to be useful. Bertrand Piccard, the endurance balloonist who co-founded Solar Impulse with Borschberg in 2003, says he wants the HB-SIA's successor, the HB-SIB, to achieve the first solar-powered flight around the world as early as 2013. [solarimpulse.com](http://solarimpulse.com)

## MASTEN SPACE SYSTEMS *XOMBIE*

### The Easiest Way to Space

**Vertical takeoff/vertical landing (VTVL)** spacecraft made an important advance in May, when a demonstration spacecraft called *Xombie*, built by the Mojave, California-based firm Masten Space Systems, became the first of its kind to shut down its engine mid-flight, restart, and then land. The eventual goal is for unmanned VTVL rockets to rise to space and return several times a day, carrying zero-gravity experiments with each pass. The challenge is to carefully consume fuel throughout the trip so that the rocket has enough to land—hence the importance of *Xombie*'s success. [masten-space.com](http://masten-space.com)



**ECONO-ROCKET** Vertical takeoff/  
vertical landing craft like Masten's  
could make six trips to space every day.

## ESA CRYOSAT-2

### The Clearest Climate-Change Picture Yet

The **European Space Agency** launched a satellite in April that will give scientists unprecedented data about the polar ice caps and track changes in the thickness of the ice down to around half an inch—essential information for monitoring climate change. The satellite, CryoSat-2, is a second attempt; the first CryoSat was destroyed by a rocket malfunction in 2005. But ESA built an advanced replacement, with software upgrades and greater battery capacity powering an interferometric radar range-finder with twin antennas, which measures the height difference between floating ice and open water. [www.esa.int/cryosat](http://www.esa.int/cryosat)



## AIRBUS MILITARY A400M

### The Most Versatile Cargo Hauler

COURTESY MIKEWASSEE.COM

## ATACAMA LARGE MILLIMETER ARRAY

### The Alpha Telescope

The **Atacama Large Millimeter Array (ALMA)** in the Chilean Andes, the most powerful radio-telescope array on the planet, powered up its first three antennas earlier this year. By 2013, engineers should finish installing at least 60 more of the 39-foot-diameter, 100-ton dishes (plus four smaller dishes). Together they will capture the narrow spectrum of radiation that can pass through interstellar dust clouds, thereby allowing scientists to observe, among other things, the gravitational collapse that initiates the birth of stars and the red-shifted radiation emitted 10 billion years ago from the far reaches of the universe. [almaobservatory.org](http://almaobservatory.org)







**HEAVY HAULER** Airbus says it will start shipping the \$140-million Airbus A400M in 2012.

**The Airbus A400M**, which made its first flight in late 2009 (after two years of delay and \$7 billion in cost overruns), is built for flexibility: It can haul two attack helicopters or 116 soldiers, while remaining maneuverable enough to get in and out of the front lines quickly. The

craft is powered by turboprops rather than jets, which can suck in debris on unimproved airfields. The relatively lightweight carbon-composite wings keep the plane's weight low enough (the exact figure is a trade secret) that, when equipped with reinforced shocks,

rugged tires and debris-resistant turboprops, the A400M can land on and take off from dirt and gravel runways. Yet the craft can carry 80,000 pounds, nearly twice as much as the rival Lockheed Martin C-130J Super Hercules. [a400m.com](http://a400m.com)

CLOCKWISE FROM TOP: COURTESY AIRBUS MILITARY; COURTESY MIKE HOWARD; COURTESY NASA; COURTESY MIKE HOWARD; COURTESY NASA; COURTESY MIKE HOWARD; COURTESY NASA

## SPACEX FALCON 9

### The First Astronaut-Worthy Private Rocket in Orbit

**When NASA retires** the space shuttle next year, the only American-owned option the U.S. government will have for getting cargo to the International Space Station is to ride with a private spaceflight company. Such an arrangement became viable in June, when SpaceX's *Falcon 9*—a 180-foot, kerosene-and-liquid-oxygen-fueled rocket capable of delivering six metric tons of cargo or seven astronauts to orbit—made its maiden voyage to space. SpaceX engineers designed nearly every piece of the rocket from scratch, and made the *Falcon 9* affordable enough that the company will haul cargo to space for \$133 million per trip, compared with \$450 million for each space-shuttle flight. SpaceX could begin regular cargo flights to the ISS as early as next year. [spacex.com](http://spacex.com)

## EADS ASTRIUM TANDEM-X SATELLITE

### Mapping the World in 3-D

**Existing satellite-generated maps** of the Earth's surface are cobbled together from multiple, inconsistent sources, leaving gaps in coverage and omitting vast amounts of detail. The TanDEM-X satellite, by working with another satellite, is set to create the first consistent digital elevation map

of Earth's entire land surface—in 3-D. Built by the European aerospace contractor Astrium for the German space program, TanDEM-X reached orbit in June and joined the original TerraSAR-X satellite, which had been in space since 2007. An EADS subsidiary will begin licensing topographic maps in 2012. [astrium.eads.net](http://astrium.eads.net)



**REMOTE VIEWING** At 16,500 feet above sea level, ALMA is the highest observatory on the planet.

**ENDURANCE RUN** The X-51A WaveRider flew for almost 20 times as long as any previous scramjet engine.

## BOEING X-37B

## Most Mysterious Aircraft

America's first reusable unmanned spaceplane, the X-37B, made its inaugural trip to orbit in April, completing more than a decade of work by NASA and the U.S. Department of Defense. The X-37B looks and behaves like a shrunken space shuttle, right down to its method of reentry; once it completes its mission, it will glide back to Earth and land on a runway in California. What is the mission? Sorry, that's classified. But we do know that this kind of unmanned mini shuttle is attractive for many reasons. Because it's smaller and doesn't carry humans, it's cheaper and simpler to launch. It can be reused repeatedly to ferry satellites to orbit in its payload bay. Soon after launch, amateur astronomers spotted the plane in an orbit used by observation satellites. [boeing.com](http://boeing.com)

PRATT &amp; WHITNEY ROCKETDYNE/BOEING X-51A WAVERIDER

## The Fastest Jet Engine

**After dropping from a B-52 bomber** 50,000 feet above the Pacific in May, the unmanned X-51A WaveRider destroyed the scramjet endurance record by flying at five times the speed of sound for more than three minutes. Despite five decades of research, engineers had previously never able to keep a scramjet (an engine that generates rocket-level speed by massively compressing air from the atmosphere) going for more than 12 seconds. That's because the air that feeds combustion in a scramjet moves through the engine at supersonic speed; the challenge is to keep that air feeding the burning fuel rather than snuffing it out. A new engine geometry and precision fuel injection made the record possible. The project, funded by the U.S. Air Force and the Pentagon's Darpa, is a step toward developing advanced cruise missiles and cheaper space transport. [pwrhypersonics.com](http://pwrhypersonics.com)

## PIASECKI/CARNEGIE MELLON AUTONOMOUS HELICOPTER

## The Smartest Autonomous Helicopter

**Previous unmanned helicopters**, like the Boeing A160 Hummingbird, could operate only in obstacle-free, pre-mapped environments. In June, engineers at Piasecki Aircraft and the Robotics Institute at Carnegie Mellon University broke that barrier when they equipped an A/MH-6 Little Bird helicopter with an autonomous guidance system and tested it on an unfamiliar course in Arizona. The copter was able to map its surroundings

on the go, recognize obstacles such as power lines and people, choose a landing site amid cluttered terrain, and set down safely, all without human guidance. GPS, inertial sensors and laser scanners gathered information about the environment, while onboard mapping software generated a 3-D map of the terrain. One promising application of this technology is to assist medevac helicopter pilots. [www.ri.cmu.edu](http://www.ri.cmu.edu)



FROM TOP: COURTESY USAF; COURTESY BOEING



# A NEW WAY OF FLYING

## HOW A RECORD-BREAKING PILOT MADE IT THROUGH THE NIGHT IN A SUN-POWERED PLANE

**BORN IN ZURICH**, Switzerland, in 1952, the year the first commercial jet airliner took flight, André Borschberg grew up longing for the skyward frontier and the “freedom of three dimensions.” He absorbed his father’s tales of reconnaissance flights during World War II. He memorized the dips and dives of *Night Flight*, Antoine de Saint-Exupéry’s novel about pioneering airmail carriers in Argentina. And at age 15, he joined a youth program offered by the Swiss Air Force, which taught him how to fly.

As he got older, though, Borschberg diversified. He came to the U.S. to pursue an MBA at the Massachusetts Institute of Technology and went on to become a serial entrepreneur. He also returned home on occasion to continue his training as a pilot in the Swiss Air Force, graduating from the twin-boom

### POPSCI PROFILE ANDRÉ BORSCHBERG

de Havilland Venom to the swept-wing Hawker Hunter and eventually to the supersonic Northrop Tiger F-5. At 51, Borschberg had started three companies and was certified on at least 30 aircraft. Yet his two passions, for business and for flight, were increasingly at odds, and he began to have “unstructured and difficult-to-describe dreams” about joining them.

In 2003, the Swiss Federal Institute of Technology in Lausanne asked Borschberg to study a plan to fly a solar plane around the globe. The idea belonged to Bertrand Piccard, whose grandfather, Auguste, invented the bathyscaphe and whose father, Jacques, dove to the Marianna Trench (the family’s heritage inspired

the naming of a *Star Trek* captain).

Borschberg thought the proposal, combining as it did the romantic spirit of the old aviators with the innovation of a start-up, was “absolutely brilliant.” Nonetheless, he took a moment to respond. “The pilot said yes immediately,” Borschberg laughed, “and the businessman gave the impression that he needed time to think.” When the study was complete, he joined Piccard as CEO to launch the Solar Impulse project. And in June 2009, after six years of development, they unveiled the *HB-SIA*, the first solar plane capable of overnight flight—a prerequisite for their plan to circle the globe. For Borschberg, the job demanded “everything I did during these last 25 years: the engineering part, the business part and the flying part.”

A year later, swaddled in a special suit to protect him from subzero temperatures, Borschberg made his own pioneering flight—26 hours aloft, a new record. After his iPod battery froze, silencing a preselected soundtrack of opera music and Leonard Cohen songs, Borschberg was left alone with the sounds of the Swiss sky. Though the cramped seat could barely contain his 6'3" frame, the sights distracted the pilot from any discomfort. “It was gorgeous,” he says. “The sunset, the moon, the stars: they carry you through.” Flying slow and straight, gazing at “the dark colors of the night reflected over Lake Bienné,” Borschberg achieved a state that he calls “conscious flight,” a sensory awareness of the airborne environment normally made impossible by the complexity of modern piloting. “We’re exploring a new way of flying,” Borschberg says. “The pleasure is unbelievable.” —JOSEPH A. BERNSTEIN

**MODEL FLIGHT** André Borschberg kept his solar plane aloft for a record-breaking 26 hours.



“THE SUNSET, THE MOON, THE STARS: THEY CARRY YOU THROUGH.”





## Sharpest, By Design

Shot hand-held on APS-C DSLR: 300mm (465mm equivalent) Exposure: F/13; 1/200th; ISO200; WB: Daylight

### SP 70-300mm F/4-5.6 Di VC USD

Introducing the Tamron SP 70-300mm F/4-5.6 Di VC USD – a new lens to celebrate our 60th Anniversary. Featuring an XLD lens element to deliver best in class optical resolution in a fast and quiet tele zoom that includes VC image stabilization and Tamron's new USD (Ultrasonic Silent Drive). Designed for Canon, Nikon and Sony full-frame and smaller sensor DSLR cameras. Sharpest, By Design. See for yourself at your Tamron dealer.

The Sony mount does not include VC as the body of Sony DSLRs includes image stabilization functionality. Therefore, the Sony mount lens is called SP 70-300mm F/4-5.6 Di USD and does not include the VC description.

new model A005

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BEST OF WHAT'S NEW 2010

# HOME ENTERTAINMENT

HOME  
ENTERTAINMENT  
**GRAND  
AWARD**  
WINNER

2010

BRIAN KLUTCH; INSET: ALLEN KEE/ESPN

PANASONIC VIERA TC-P50VT25

## Vivid in All Dimensions

**In a fight**, your home theater could now take on any cineplex, thanks to this 3-D TV. While other TV makers entered the third dimension with upgraded LCDs, Panasonic was the first company to work with ultrafast plasma. And it turns out that plasma is what it takes to make at-home 3-D beautiful. Panasonic's set produces a crisp high-def 3-D (or a regular ol' 2-D) image even when there's a lot of movement, as in a chase scene or soccer game, because every dot on the 50-inch screen refreshes

120 times a second—for clean pixels every time, with no “ghosts” left over, as happens with even the fastest LCDs—providing 60 independent images per eye. Only plasma can completely refresh that quickly. Glasses with LCD-screen lenses flicker in time with the left and right images on the TV, so each eye sees only the frames meant for it. Analysts predict that eventually most sets sold will be 3-D-ready. This one has set the benchmark. **\$2,600; [panasonic.com](http://panasonic.com)**

PANASONIC HDC-SDT750

## First High-Def 3-D Camcorder

A hybrid camcorder that records two images with one sensor, the SDT750 makes 3-D practical. The 2-D camera comes with a dual-lens accessory that separates what the left and right eye see before the image sensor merges them as one file. The resulting video is the same format as 3-D cable broadcasts, which combine the left and right images side by side in one frame. Any 3-D-capable TV can then separate and flicker the images. \$1,400; [panasonic.com](http://panasonic.com)



**BIG TALKER** The Audyssey dock blares the sound of speakers twice its size.

AUDYSSEY AUDIO DOCK,  
SOUTH OF MARKET EDITION

## The Booming-est Mobile Bass

Compact speaker docks have always come up short on bass, but Audyssey's entry produces the bass of a speaker twice its size, signaling an end to drab mobile sound. Other docks virtually amp up the bass by reducing the volume of mid and high tones so that the woofers don't buzz or blow out. This dock's processor instead monitors the woofers and moves them as far as they can go (just before buzz can occur), so the bass is consistent and strong. \$400; [audyssey.com](http://audyssey.com)



SONY PLAYSTATION MOVE

## Most Immersive Game Controller

Sony's Move is the first motion-capture game system accurate enough to attract the hardcore gamers who consider the Wii and Microsoft Kinect to be kids' stuff. A camera near the TV tracks a glowing sphere on top of a wand to follow a player's horizontal and vertical movement, as well as the distance from the screen, while accelerometers and gyroscopes sense rotation. All this translates into the ability to take out zombies in *Resident Evil* with dead-on accuracy. \$100 (in bundle with camera and *Sports Champions* game); [playstation.com](http://playstation.com)

CLOCKWISE FROM TOP LEFT: BRIAN KLUTCH; COURTESY SCEA; BRIAN KLUTCH (2)  
FACING PAGE, FROM TOP: BRIAN KLUTCH; COURTESY IMMERZ



**BRIGHT IDEA**  
LightSpeakers hide  
inside ceiling light  
sockets.

BEST OF WHAT'S NEW

HOME ENTERTAINMENT  
2010



#### KADENCE DESIGNS KLIPSCH LIGHTSPEAKER

## The Simplest Home Sound

**The pros are paid** big money to make house-wide speakers invisible, but now you can do it yourself. Each of Klipsch's speakers and 20-watt digital amplifiers are hidden behind an LED bulb, and the entire package fits into a standard recessed ceiling-light socket. Plug the five-inch base station into your stereo system, and it sends audio to up to eight speakers at a speedy 2.4 gigahertz. **\$600 (two-speaker kit); [www.klipsch.com](http://www.klipsch.com)**

#### IMMERZ KOR-FX

## Shock Waves

**Playing games is one thing;** feeling them is another. The KOR-fx collar adds physical sensation to videogames and movies. The device plugs into the audio from an iPod or game console and funnels the bass into down-firing stereo speakers that rest on your collarbone, so you can feel which side a gunshot is coming from. Expect games designed with dedicated KOR-fx sound effects next year, but titles such as *Starcraft II* and *Call of Duty 4* already have KOR-fx-approved audio. **\$190; [immerz.com](http://immerz.com)**



# Gaming for Everyone

If you have the Internet, there's now nothing between you and graphics-heavy titles like *Assassin's Creed II*. No high-end rigs or pricey graphics cards are necessary: OnLive's servers do the work. The service scales games for your screen and streams them to your computer—even a mere netbook—over broadband or Wi-Fi. An upcoming mini console sends games to your TV, and the service may eventually work on iPads and cellphones. **Games from \$30; [onlive.com](http://onlive.com)**

GOOGLE TV

BEST OF WHAT'S NEW

HOME ENTERTAINMENT  
2010

## The First TV Search Engine

**Google has transformed** how we get information on computers and cellphones, and now it's set to upend television. *Good Morning America?* *Top Chef?* It's all just data to Google TV, and soon you'll be able to be as picky about what you watch as you are about the blogs you read. The service searches metadata, such as titles and keywords, from cable guides and the Web—even DVRs on the Dish Network—to cull results. What's more, since Google TV is an open platform, developers will soon be able to create apps to embed more info (such as IMDb entries) or translate closed captions in real time. All that requires a little computing power from a low-power PC processor, which is currently built into an add-on set-top box from Logitech as well as a Sony HDTV and Blu-ray player. **[google.com/tv](http://google.com/tv)**



**GAME ON** OnLive's card-deck-size console lets you play titles from any platform on any TV.

BRIAN KLUTCH



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**OP 10x42DH Mark II**  
OP 8x42DH Mark II also available



The charm of this model is its ergonomically contoured, open-hinge design. These binoculars are waterproof, rugged and easy to grip, making them ideal for use in the field. With fully multi-coated optics, the phase coated roof prisms have also been coated with a super-high reflective silver, providing razor sharp, ultra bright images. Kenko OP series and all the binoculars in the professional line are made in Japan.

Please Call (800) 421-1141 for Authorized Retailers

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BEST OF WHAT'S NEW 2010

## SECURITY

SECURITY  
**GRAND  
 AWARD**  
 WINNER

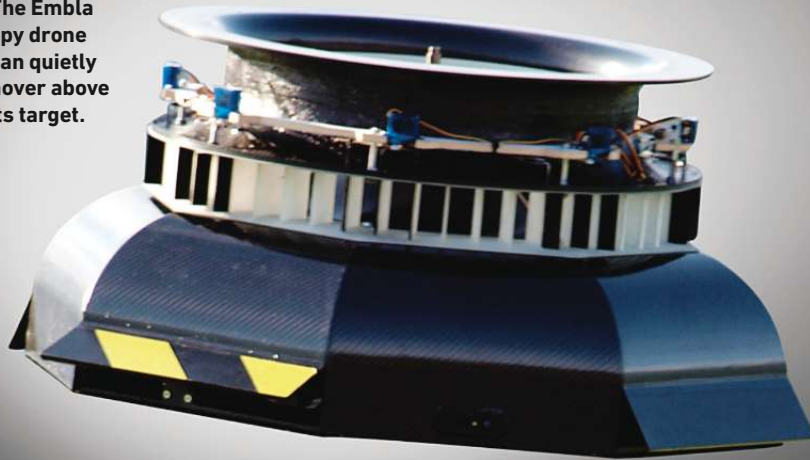
2010

HYDRONALIX EMILY

## The Fastest Lifeguard

**Ocean riptides** drown an estimated 100 people every year in the U.S. They can sweep a swimmer out to sea at up to eight feet per second, outpacing even the strongest lifeguard. EMILY, the Emergency Integrated Lifesaving Lanyard, is a four-foot-long remote-controlled rescue buoy that can zip across choppy waves at up to 26 mph, reaching a drowning victim 10 times as fast as any swimmer. Propulsion comes from an electric motor and a Jet Ski-type impellor that pulls water in and ejects it out the back, generating enough thrust to safely tow a struggling swimmer back to shore. Lifeguards remotely steer the craft to its target and use an onboard camera and speaker to communicate with victims. Manufacturer Hydronalix has successfully tested EMILY at more than 20 beaches nationwide and next year plans to introduce a version that can navigate on its own using sonar. **\$3,500; [hydronalix.com](http://hydronalix.com)**

**LURKER**  
The Embla  
spy drone  
can quietly  
hover above  
its target.



**AESIR EMBLA**

## Stealthiest Hovercraft

It launches and lands like a helicopter, without all the noise and wind of whirling rotor blades. Instead the Embla sucks in air through its top and forces it out side vents to gain altitude and hover, causing no more ruckus than a seagull taking flight. Outfitted with an HD video camera, this 18-pound remote-controlled craft is ideal for surveillance missions.

It's easy to launch in tight spaces, such as off the back of a truck, and it can fly where fixed-wing drones can't, swooping between buildings in search of enemy hideouts or hovering above a disaster area as it scans the wreckage for victims. Its internal combustion engine lets it fly up to 80 mph and as high as 10,000 feet. [aesir-uas.com](http://aesir-uas.com)

## DECISION SCIENCES INTERNATIONAL MULTI-MODE PASSIVE DETECTION SYSTEM

### The Surest Way to Detect Nukes

Millions of cosmic particles called muons bombard Earth every day. Heavier atoms in dense elements like plutonium and uranium deflect these particles more than lighter atoms. For researchers at Decision Sciences, this inviolable fact of physics makes finding hidden nuclear material at ports and borders simple: A packing crate with a nuke inside is going to deflect particles. This year, the company rolled out the first commercial nuclear detector that analyzes these deflection patterns. The system can scan a truck in less than a minute, mapping the source of deflected muons as they glance off the cargo. It's faster and more reliable than x-ray scanners, which often can't see through steel or lead. [decisionssciencecorp.com](http://decisionssciencecorp.com)

## UNIVERSITY OF TOKYO OLFACTORY SENSOR

### The Sharpest Sniffer

Researchers have long sought a chemical detector that's sensitive enough to discern even the faintest whiff of airborne contaminants such as ammonia and sulfur dioxide. Now University of Tokyo researchers have built one based on one of nature's champion sniffers: insects. The scientists injected unfertilized frog eggs with genes from fruit flies and moths, the olfactory

cells of which are highly sensitive to chemicals, and sandwiched the eggs between two electrodes. The cells can be genetically modified to screen for specific molecules in concentrations as low as a few parts per billion, and their ability to distinguish between very similar molecules leads to a low incidence of false positives. [www.u-tokyo.ac.jp](http://www.u-tokyo.ac.jp)

## LINCOLN LABORATORY ISIS

### The Spycam Most Likely to Catch Spies

With surveillance cameras at most big facilities, such as airports, guards monitor multiple screens. And if they zoom, they lose image resolution, along with perspective on the surrounding area. The Imaging System for Immersive Surveillance (ISIS) solves these problems by combining nine video cameras in one device. Mounted to a ceiling, ISIS offers 360-degree, 100-megapixel views on a single screen. Image-stitching software merges multiple video feeds into one scene. The system also allows operators to tag and follow targets, and can monitor restricted areas and sound an alert when intruders breach them. Watch for ISIS (it will be watching for you) at Boston's Logan International Airport, where the system debuted last December. [www.ll.mit.edu](http://www.ll.mit.edu)

**EVIL EYE** The ISIS offers nine camera angles in one device.



## SIERRA NEVADA CORP. GORGON STARE

### The Most Intimidating Drone Accessory

Most UAV sensors allow an operator to see only a narrow patch of land, as though looking through a soda straw. The Gorgon Stare, on the other hand, allows multiple operators to monitor a two-square-mile swath of land and simultaneously track up to 12 different targets. Optical and infrared cameras capture video day and night, and software stitches those images together in a single mosaic scene. [snrcorp.com](http://snrcorp.com)



## SWIMMER'S EAR

The First Alert Pool Alarm listens for acoustic energy underwater.

## FIRST ALERT POOL ALARM

## Child-Saver

Swimming pools can be the most dangerous part of summer—about 300 children under the age of five drown in them every year. First Alert Pool Alarm is the easiest and most effective defense. Other wireless alarms detect water displacement, but the First Alert uses a much more sensitive sonar detector. A hydrophone dips beneath the water line, where it listens for sound waves within 1,600 square feet. The alarm's algorithm can distinguish between a child falling into the water and an errant pool toy, and when the system senses the former, an 85-decibel alert quickly gets the attention of adults inside the house. **\$700; [firstalert.com](http://firstalert.com)**

BI2 TECHNOLOGIES  
MORIS

## Smartest Smartphone

**The iPhone now fights crime.** MORIS, the Mobile Offender Recognition and Identification System, is a 2.5-ounce hardware attachment and software app that turns a smartphone into a powerful handheld biometric device. It combines iris recognition, fingerprint scanning and facial recognition, allowing police officers to ID suspects in seconds without taking that long trip downtown. After an officer snaps a photo of a suspect's face, scans his iris, or takes his prints with MORIS's built-in fingerprint scanner, the phone wirelessly and securely combs through databases of existing criminal-justice records for a match. Police officials in Massachusetts consider these features well worth the price tag: At least 25 police departments in the state now use the system. **\$3,000; [bi2technologies.com](http://bi2technologies.com)**

ROBOTIC TENTACLE  
MANIPULATOR

## Grippiest Robot Arm

**For delicate, dangerous work,** the human hand can't be beat, but it *can* be blown off. Now the U.S. Army Research Laboratory has devised a way to make a robot hand that's nearly as nimble. Its Robotic Tentacle Manipulator is an octopus-like attachment that can fit onto many robotic platforms, giving the machines the ability to gently grip and precisely manipulate objects. Each 10-inch tentacle contains several motors that allow it to flex and bend like a snake, while touch-sensitive pressure sensors enable it to balance fragile objects, rotate doorknobs, or grab onto tree branches. Operators can add as many tentacles to the device as the mission demands. **[www.arl.army.mil](http://www.arl.army.mil)**

MORPHO DETECTION  
SHOESCANNER

## Best Shoenbomb Sleuth

**The days of padding** through airport security in your socks may soon be over. The ShoeScanner combines three detection technologies to reveal metal or trace explosives concealed in shoes or pant legs. The system can tell a shoe shank, for example, from a box cutter, drastically reducing the risk of false alarms. And it's fully automated, so it won't tax Transportation Security Administration staff. Passengers simply step on two oversize footprints and wait several seconds for the device to flash green or red. It underwent testing at Indianapolis International Airport this year and could be TSA-approved as early as next year. **[morphodetection.com](http://morphodetection.com)**

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Uniden's HomePatrol-1 is a revolutionary touchscreen receiver that puts you in the middle of the action. Simply enter your zip code then instantly listen to police, fire, aircraft, road crews, weather reports & more.\* Whether it's across town or across the street, HomePatrol-1 keeps you informed.

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# BEST OF WHAT'S NEW 2010

# COMPUTING



BRIAN KLUTCH

## INTEL WIRELESS DISPLAY

## Over-the-Air Home Theater

**The Web offers more** entertainment than cable, but who cares when it's all stuck on tiny laptop screens? Now, Intel's Wireless Display (WiDi) makes the Internet watchable by streaming whatever is on your PC—from *House* on Hulu to live games on *NFL.com*—to your big, beautiful TV, no programming or wires required. The key is how Intel's latest Core iSeries processors, currently found in more than 50 laptops, talk to an included receiver box, which connects to your TV with a one-time setup. When you activate the WiDi (by pressing a dedicated button on the laptop keyboard), the chip creates a data stream out of the display information. Then it borrows some bandwidth from your Wi-Fi card to beam a smooth live image of your screen to the receiver. For now, WiDi is limited to 720p video, but a future upgrade will work with full 1080p high-def. And upcoming WiDi-ready TVs will cut out the receiver-box middleman. [intel.com](http://intel.com)

COMPUTING  
**GRAND  
AWARD**  
WINNER  
**2010**



## SEAGATE BLACKARMOR PS 110 USB 3.0 PERFORMANCE KIT

## Blazing Backup

**USB 3.0 is fast**—fast enough to copy a 100-gigabyte video library in about 20 minutes. Seagate's drive was the first to make that speed accessible. Thanks to USB 3.0's five extra connector pins and a faster-spinning hard drive, the PS110 copied data three times as fast as a USB 2.0 model, and it bundled a converter to upgrade any laptop to 3.0 through its ExpressCard slot, paving the way for the company's current GoFlex hard drives. **\$180; [seagate.com](http://seagate.com)**

## SWIFTPPOINT MOUSE

## A Mouse for Small Spaces

**When you use a laptop** in a cramped airline seat, you have to sacrifice a mouse and use the less-accurate trackpad. The Swiftpoint, though, fits on the small, flat surface alongside the trackpad, turning your laptop into a no-compromise mobile workstation. To work in tight spaces, it uses a miniaturized version of the standard optical sensor and is held between your thumb and forefinger for precise control. **\$70; [futuremouse.com](http://futuremouse.com)**

## AMD RADEON HD 5870 EYEFINITY 6

## Maximum Monitor

**AMD's graphics engine** runs six screens, enveloping you in games and movies even as it saves you money, energy and processing power. Most graphics cards can run only two monitors at once, but AMD's single card sets a new standard by doing the job of three.

Its driver software works around Windows's four-monitor limit by telling the operating system to see all six screens as one big image. It delivers the final picture over the card's fast, high-bandwidth monitor connection. **\$500; [amd.com/eyefinity](http://amd.com/eyefinity)**



## PIXEL QI 3QI DISPLAY

## Sun Screen

**Swap this zero-glare screen** for your netbook's current LCD, and you'll be able to watch video or surf the Web, even in direct sunlight. The Pixel Qi display, originally developed for the One Laptop Per Child project, adds a reflective layer to each pixel on a standard LCD, so when you turn off

the glare-inducing backlight, the screen reflects ambient light and gives the pixels a faint glow, producing an effect similar to E-Ink. Pixel Qi screens will be prebuilt into tablets by year's end, with notebooks and cellphones following next year. **\$275; [pixelqi.com](http://pixelqi.com), [makershed.com](http://makershed.com)**



**TIGHT FIT** The palm-sized Swiftpoint needs only a couple of inches to work.

CLOCKWISE FROM TOP LEFT: COURTESY SEAGATE; COURTESY SAMSUNG; INSET: COURTESY CAPCOM ENTERTAINMENT; COURTESY NICK WRIGHT/IMAGIC



TOSHIBA  
LIBRETTO W105The  
Keyless  
Laptop

The **Libretto**, an all-touchscreen computer, is the first Windows 7 PC to forgo keys, taking full advantage of the OS's ability to read multiple points of screen contact at once. Its second seven-inch screen displays a virtual keyboard or can share a double-wide image with the upper screen. It's sleek and subtle. An accelerometer detects when the notebook is upright, for instance, so you can read side-by-side pages of an e-book as you would a hardbound edition. \$1,100; [laptops.toshiba.com](http://laptops.toshiba.com)

ADOBE  
PHOTOSHOP CSSIntelligent  
Photo Editor

Retouchers no longer have to work pixel by pixel to fill in missing backgrounds. The new Photoshop makes use of an algorithm, developed with Princeton University and the University of Washington, that takes thousands of color patches from the image to find similar flecks to make a new sky or fill in the background when you trim out an obscuring branch or even a stranger who wandered into the shot. \$700; [adobe.com](http://adobe.com)

WORLD WIDE WEB  
CONSORTIUM HTML5

## The Universal Web

HTML5 is a new Web language, standardized in cooperation with the WHAT Working Group, that will eventually allow any browser—on a computer, phone or iPad—to present video, animation and games, without the aid of tricky software add-ons, such as Java, Flash or Silverlight. Developers will just code in what they want, and you'll watch CNN, Major League Baseball and YouTube on any device with a browser. [w3.org](http://w3.org)

# FROM **ANTHEM**, THE #1 ELECTRONICS BRAND\*

## WHAT MAKES **ANTHEM MRX RECEIVERS** MUCH BETTER VALUE FOR THE MONEY THAN OTHER HIGH-END RECEIVERS?

- ✓ Anthem Quality!
- ✓ Anthem Performance!
- ✓ Exclusive Anthem Technology.
- ✓ Price! Extraordinary for everything you get!
- ✓ 7 channels of power — more continuous power than anything in their price range:

**MRX 700: 120 watts per channel**

**MRX 500: 100 watts per channel**

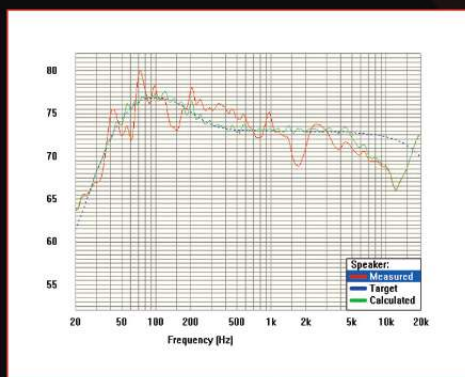
**MRX 300: 80 watts per channel**

... plus all the other stuff you really want to do

- ✓ Yes, you can play music from a flash drive or USB hard disk drive (MRX 700/500).
- ✓ Yes, you can listen to Internet Radio (MRX 700/500) via built-in ethernet port; HD Radio too on the MRX 700.
- ✓ Yes, they're 3D ready.
- ✓ Yes, they're intuitive with user-friendly menus.

### ARC in action ...

Left Front Speaker - ARC measures, calculates and corrects for sound anomalies caused by room boundaries and reflective surfaces.



## ARC

## WHAT IS **ANTHEM ROOM CORRECTION** AND WHY IS IT THE BEST ON THE MARKET?



Even when the finest speakers are perfectly positioned, the room itself can have a dramatic negative impact on sound quality. Room dimensions, dead spots, archways, even furniture can turn a room into an additional instrument adding unwanted coloration and resonance to music and movies.

ARC adjusts for the room's effect on the speakers in a way that mimics our hearing. Now your Anthem gear and your Paradigm speakers can do what they do best: allow you to lose yourself in the music or movie you're watching.

### How does ARC do what it does?

- ARC analyzes each speaker's in-room response then sets output levels, crossover frequencies and room correction parameters for each one.
- ARC applies correction for up to 7 channels plus the sub!
- ARC applies Super-Efficient Infinite Impulse Response (IIR) filters in addition to Anthem's custom topology ... this baby runs quickly and quietly.
- Unlike other room correction systems, ARC allows for multiple microphone measurements, that way everyone in the room gets a better listen, not just those sitting directly between the speakers.
- Processing power to spare!
- ARCuracy! The connected PC's 64-bit floating point processor calculates the correction curves to the n'th degree of accuracy.
- Separate configurations for music and movies.
- Applies correction to peaks and dips in room response — since rooms have both, we get a far more natural and accurate response tackling both!
- Fully automated or manual setup.

**ANTHEM**  
THE KEY TO HIGH END AUDIO-VIDEO™

\*Inside Track Dealer Survey. An annual independent nationwide survey of consumer electronics specialist retailers and custom installers.

Full details at [www.anthemAV.com](http://www.anthemAV.com).



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BEST OF WHAT'S NEW 2010

# HOME TECHNOLOGY

HOME  
TECHNOLOGY

GRAND  
AWARD

WINNER

2010



BRIAN KLUTCH

## NEATO ROBOTICS XV-11 ROBOTIC VACUUM CLEANER

### The Four-Star General of Vacuums

Unlike the better-known Roomba, which cleans at random, bouncing off furniture and redirecting itself, the Neato XV-11 vacuums strategically. It surveys the room with its infrared laser range-finder, taking 4,000 readings a second and measuring the distance to every object within 15 feet, and repeats this reconnaissance from several vantage points until it has constructed a bulletproof plan of attack. Next it goes to work, vacuuming around the

perimeter of the room and then taking out the center, zooming up and back in neat rows. It scans constantly for new obstacles as it moves, so it won't be defeated by a surprise cat or toddler. Laser navigation conserves battery life, allowing the vacuum to cover new ground with every sweep instead of hitting the same patches over and over. The XV-11 devotes 80 percent of its energy to vacuuming—a feat worth saluting. \$400; [neatorobotics.com](http://neatorobotics.com)

## Sucks Dust, Saves Lungs

**Tile-setter Joel Beaton** spent 17 years inhaling dust from powdered grout and mortar, which often leads to "potter's rot," or silicosis, an occupational lung disease marked by asthmatic symptoms. Now Beaton has invented a vacuum attachment that snaps onto a mixing bucket and keeps dust from escaping. The tool evenly distributes the vacuum's suction so it draws in the maximum amount of debris. It's a simple idea, with brilliant results. **\$20; [waletale.net](http://waletale.net)**



**POWER PISTON**  
Milwaukee's palm nailer drives a beefy framing nail in less than two seconds.

### MILWAUKEE M12 PALM NAILER

## The Toughest Auto-Hammer

Finally, a cordless palm hammer that takes the effort and hassle out of pounding nails in tight locations, such as between joists or beneath a deck, without sacrificing power. The M12's compact, powerful lithium-ion battery drives an internal steel piston up to 2,700 times per minute, no compressor needed. Position the nail, press the trigger, and *whammo*. This auto-hammer packs power—while others max out on finishing nails, the Milwaukee can sink a five-inch pole-barn spike. **\$130; [milwaukeeetool.com](http://milwaukeeetool.com)**

### LEHR PROPANE-POWERED ECO MOWER

## A Lawn Mower That Minds Its Emissions

Gas mowers belch fumes, but old-fashioned reel mowers lack power. The Eco LawnMower strikes a balance. Its chokeless 139cc internal combustion engine emits three fifths less carbon monoxide than a gas mower and exceeds the Environmental Protection Agency's emissions standards by 60 percent. A 16-ounce can of camping-style propane lets you mow for up to 90 minutes, 20 to 40 percent longer than the same amount of gasoline lasts in a standard mower. And unlike gas, pre-packed propane canisters won't leak fuel all over your garage. **From \$300; [golehr.com](http://golehr.com)**



### KENMORE CONNECT

## Calls for Help

Kenmore's new **Connect** technology allows washers and dryers to send diagnostic data to a technician over a phone line. Customers just call an 800 number and then hold the phone up to the appliance. Through a series of beeps, it transmits data about more than 100 variables, from water temperature to spin speed. Service experts either talk you through a fix or send out a repairman prepped for the job. **[kenmore.com](http://kenmore.com)**

### GENERAC POWER SYSTEMS 7-KILOWATT COREPOWER SYSTEM

## Power Out? It Knows

During storms or other events that knock out power, walking outside to turn on a portable generator is inconvenient and dangerous. This standby power generator turns on automatically when the power goes out and restores electricity to your home within 10 seconds. There's no fumbling with extension cords or switches. The generator runs on propane or natural gas, for which many homes already have plumbing, instead of diesel or gasoline. **\$1,800; [generac.com](http://generac.com)**

### GTR TECHNOLOGIES DEWSTOP CONDENSATION DETECTOR

## Brainiest Dew-Fighter

Condensation can turn a bathroom into a mold factory that ruins tile and triggers allergies. DewStop's weather-prediction software turns on the bathroom fan when temperature and humidity levels get too high, and it predicts how long the fan should run based on how much water vapor is in the air, so the fan won't waste energy or shut off too quickly. And whereas other detectors require installing a new ventilation system, DewStop easily connects to existing bathroom fans. **\$60; [dewstop.com](http://dewstop.com)**



**BOSCH AXIAL-GLIDE  
12-INCH MITER SAW**

# The Smoothest Saw

Sliding compound miter saws are great for making precision angled cuts across wide boards. But their blade heads move along fixed metal rails that hog space on a crowded workbench—and get gummed up by wood dust. Bosch's new saw is the first to ditch the rails for jointed mechanical arms that extend the reach of the blade by folding out and back like a dentist's lamp. With no rails sticking out of the back, it sits flush against the wall, taking up a foot less workshop space. Sealed ball bearings inside the sturdy aluminum arms let you smoothly glide the saw back and forth for effortless cuts. \$800; [bosch.com](http://bosch.com)

**NEW ANGLE** Bosch reinvents the sliding miter saw with a pair of articulating arms that extend the reach of its blade.



BRIAN KLUTCH

MILWAUKEE AX  
SAWZALL BLADE

## Tough as Nails

**Reciprocating saw blades** let demolition crews cut hard, fast and dirty. Slam the blades into walls, and they rip through studs, nails and wiring. Crews forgo smooth cuts for speed, choosing blades with widely spaced teeth that tear wood apart. But the gaps can catch nails and snap teeth. Instead of narrowing the gaps, which can slow cutting, Milwaukee reshaped the teeth, adding small nodules that slightly project over the gaps to block nails. The result is a blade with virtually unbreakable teeth that cuts twice as fast.

\$23/five-pack of nine-inch blades; [milwaukee.com](http://milwaukee.com)

EADES APPLIANCE  
TECHNOLOGY  
SOUSVIDE SUPREME

## For the Tenderest Meats

*Sous vide* is French for “under vacuum,” but the key to sous-vide cooking is keeping the vacuum-sealed ingredients submerged in a bath of circulating water and held steady at a low temperature for hours or even days. This ensures that food cooks evenly and retains its full flavor and moistness. The method used to require costly lab-grade immersion circulators to control the water’s temperature and flow, but now the SousVide Supreme offers the same results at one third the cost of pro systems. \$450; [sousvidesupreme.com](http://sousvidesupreme.com)

**NICE CHOMPERS** Newly designed teeth keep nails out of the gullet so the blade won't catch and break.

## RIDGID 12-VOLT LITHIUM-ION JOBMAX KIT

## One Tool to Rule Them All

**The JobMax drills** in tight spaces, such as under sinks and in cabinets. But what if you also need to loosen a nut or drive a nail? Pop the drill head off its 12-volt lithium-ion power base, and you can snap on other attachments, transforming the JobMax into an oscillating tool, a ratchet, an impact driver or even a hammer—all activated by squeezing a variable-speed trigger on the handle. \$150; [ridgid.com/jobmax](http://ridgid.com/jobmax)





# SHOES ON STEROIDS?

gravity defyer™

VERSOSHOCK TRAMPOLINE FOOTWEAR



*Imagine not being tired anymore... Imagine being pain free and filled with energy... Stop Imagining!*

**Walk and run faster, jump higher—no fatigue and no more pain!**

## GDefy Benefits

- Relieve pain
- Ease joint & spinal pressure
- Reduce fatigue & tiredness
- Be more active
- Have more energy
- Appear taller
- Jump higher, walk and run faster
- Have instant comfort
- Cool your feet & reduce foot odor
- Elevate your performance



**Should G-Defy be banned from Athletic Competition?**  
They might be considered an unfair advantage.

## Genesis of Athletic Excellence

Elevate your game to the next level. Feel the drive, the inspiration, the energy as you slip your feet into the most exhilarating shoes in the world! Go from the weekend warrior to the daily champion at your gym and on the street.



**a \$129.95 value**

**MEN** (Shown above)  
TB902MWBS  
sizes 7 - 13  
Med/Wide and ExtraWide/XXWide Widths  
**WOMEN** (Silver with Navy)  
TB902FWBS  
sizes 5 - 11  
Med/Wide and ExtraWide/XXWide Widths

## Versoshock™ Trampoline Technology

Within 10 days of regular use, the special combination of space age rubber and lightweight, durable springs will adjust to your activities and begin to improve your overall comfort.

Give your whole body a break from the stress of your high impact life and experience breakthroughs in your athletic lifestyle. Be in action. Be unstoppable. Be comfortable and live pain free.

## Great News for the Overweight?

Extra weight puts an added toll on your bones and joints. Running isn't an option, and walking can become difficult. G-Defy Shoes will take the pressure from your large frame body, make you more active and change your life forever!

## Ease Joint Pain!

You will notice immediate relief of common pain during exercise as the springs of G-Defy athletic shoes absorb most of the impact—instead of your body—by easing the stress on your joints, back and neck while walking, running, or jumping.

## Customer Satisfaction Speaks for Itself!

4 out of 5 customers purchase a 2nd pair within 3 months.



**ABSORB SHOCK**  
Eliminate pain from every step.



**REBOUND PROPELS YOU FORWARD**  
Reduce fatigue. Be more active



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Discover Rosetta Stone's award-winning solution, now with an entirely new online experience that fully immerses you in language as never before.

- Learn naturally using our unique software, complete with proprietary speech-recognition technology.
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The Gift That  
Speaks Volumes.

**SAVE UP TO \$150**

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Level 1	\$40 OFF	<del>\$249</del>	\$209
Level 1, 2, & 3	\$100 OFF	<del>\$579</del>	\$479
Level 1, 2, 3, 4, & 5	\$150 OFF	<del>\$749</del>	\$599

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BEST OF WHAT'S NEW 2010

## RECREATION



COURTESY SEALEGS INTERNATIONAL

## SEALEGS 7.1M RIB

## Travel on Water or Off-Road

**The first-ever commercial** amphibious vessel with retractable all-wheel drive, the Sealegs rigid inflatable boat (RIB) allows boaters to launch and land nearly anywhere. On land, the 23-foot craft gets around on three 25-inch all-terrain tires. Each wheel is powered by its own hydraulic motor, while an onboard 24-horsepower motor provides

the fluid. It tops out at 6 mph but can crawl over even the toughest terrain. The drive system adds just 335 pounds to the Sealegs's weight, so when the wheels are folded up and out of the way, it rides as well as any high-performance RIB. In boat mode, a 150-horsepower outboard motor propels the V-shaped aluminum hull to a top speed of 48

mph. Military and rescue organizations, including the Royal Thai Navy, are using the craft to quickly access hard-to-reach locations and more easily transfer accident victims from the water to ambulances. But for pleasure boaters, Sealegs simply makes entering and leaving the water as easy as it gets. **From \$89,900; [sealegs.com](http://sealegs.com)**

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2010

**IT'S SO EASY** Slash and other rock stars have already started using EverTune-equipped guitars.



#### EVERTUNE BRIDGE

## A Guitar That Never Goes out of Tune

Guitarists' constant struggle to keep their instrument in tune may be a thing of the past. Created by inventors Cosmos Lyles and Paul Dowd, the EverTune bridge uses a lever-and-spring system to maintain consistent string tension, even if the temperature changes, the guitar is played extra hard, or the tuning pegs are turned accidentally. Retrofits for old guitars are available now, and new guitars with EverTune built in should hit guitar shops next year. **\$330; [evertune.com](http://evertune.com)**

#### HUTCHINSON SERENITY

## The Toughest Bike Tire

**Better known** for making rubber seals for NASA, Hutchinson is the first company to get airless bicycle tires right. The Serenity consists of a solid tube-like core made from a foam-type material, and an exterior rubber tread. No air means there are no pressure adjustments to make and, even better, no flats. It's lightweight and long-lasting, and you can add a new tread without having to replace the whole tire. **Price not set; [www.hutchinsontires.com](http://www.hutchinsontires.com)**

**KEEP ON ROLLING** The lightweight Serenity is built to remain flat-free for 5,000 miles.



## POINT 65 TEQUILA Kayak in a Snap

**The Swedish company** Point 65's Tequila is the first kayak that can be broken down Lego-style into pieces for easy storage and transport. When it's time to hit the water, assembly takes only 10 seconds. You can also add pieces to make a tandem kayak, or even a monster version for multiple riders. No matter what size you choose, the polyethylene craft remains as durable and maneuverable as any conventional high-performance kayak, and it provides ample storage and legroom, letting you sit comfortably while wondering why no one had thought of this before.

**From \$600; [point65.com](http://point65.com)**

#### OZONE R10.2

## Long-Range Paraglider

**Every choice matters** in the design of a paraglider, down to the number of lines supporting the harness. Pilots try to maximize glide (the ratio of the distance a glider moves forward to the distance it moves downward) by minimizing drag, and fewer lines generally translates into less drag and a longer flight. For its newest glider, Ozone figured out a design that safely uses only two lines instead of the customary three or more, and added a wing reinforced with plastic wire to maintain its shape. The result is a major reduction in drag, allowing gliders to travel more than 200 miles in a single flight. **\$4,900; [flyozone.com](http://flyozone.com)**



## PARROT AR.DRONE

# Watch Where You're Flying

The next generation of remote-control aircraft has arrived. Instead of using a traditional controller, you pilot the Parrot AR.Drone using an iPhone or iPad app over a Wi-Fi network. The "quadricopter" is held aloft by four motor-driven propellers and stabilized by an accelerometer, gyrometers and an ultrasound altimeter. It comes

equipped with two video cameras, one on the bottom (which also aids stabilization) and one set to a wide angle at the front, so whatever it sees, you see on the phone or tablet screen. That also lets it double as a flying videogame machine, with a host of augmented-reality (AR) games coming soon. **\$300; [parrot.com](http://parrot.com)**



## BIONX PL-350-SL-XL

### A Powerful E-Bike

Sometimes you just can't pedal all the way up that giant hill to your house. Now your bike can help. The 48-volt lithium-ion battery and 350-watt high-torque motor that make up the BionX PL-350-SL-XL electrically assisted bicycle-conversion kit can boost your pedal power by as much as 300 percent. At 17 pounds, the system, which attaches to nearly any bike frame, is 25 percent lighter than the original version and keeps you riding at up to 20 mph for 65 miles on a single battery charge. **\$2,200; [bionx.ca/en](http://bionx.ca/en)**

## HYDROFLEX SUPERCHARGER TECHNOLOGY

### The Most Durable Surfboard

German surfboard-manufacturer Hydroflex has developed a "Supercharger Technology" process in which the surfboard foam is blasted with tiny pieces of fiberglass and resin. This forms a kind of root system that anchors the foam core to the fiberglass-and-epoxy-resin shell, making the board lighter and more durable than regular foam-and-fiberglass models. Hydroflex boards are nearly impossible to ding permanently and—in a first for the industry—fully recyclable. You can even pressurize the board by adding air to the pores in the foam with a bicycle pump, changing its stiffness to better handle the day's surf conditions. **\$700–\$1,000; [hydroflex-surfboards.com](http://hydroflex-surfboards.com)**



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# HOW 2.0

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Mad scientists do battle on Japanese TV



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Why it's worthwhile to build your own PC

YOU BUILT WHAT?!

## SHARP-DRESSED MAN

An iPhone-controlled LED suit tears up the dance floor

The first time Marc DeVids attended Dragon\*Con, a sci-fi convention sometimes known as Nerdi Gras, he felt distinctly underdressed amid all the aliens and space travelers. He decided to outdo them the next time with a project tailor-made for the event's late-night, darkened dance floors: an LED-laced, iPhone-controlled, all-white suit that flashes light patterns in time with the music. Travolta, meet *Tron*.

DeVids, a 26-year-old electrical engineer, started with 40 LEDs, but when a quick test showed that they didn't produce the dazzling effect he wanted, he bought another 160. He sewed all 200 to the outside of a white shirt and matching white pants, and wired each of them to a lithium-polymer battery stashed in his left pants pocket. Then he covered them with a layer of nylon to diffuse the light, and added another white-shirt-and-pants layer.

He purchased the necessary Arduino microcontroller to turn the LEDs' source code into illuminated action and linked it to a circuit board he designed and fabricated himself. For an iPhone user like DeVids, the next step was obvious: He needed an app for that. He wrote a series of

(CONTINUED ON NEXT PAGE)

### BRIGHT IDEA

Marc DeVids says he designed his suit specifically for the geek appeal: "You can slap a blinking LED on anything, and people will love it."



## Hear the buzz?



### It's about the new Electric Rabbit.

The display screen shows how many corks you can pull before re-charging. The compact design is up to 3 inches shorter than other electric corkscrews. The recessed spiral fits neatly over a wine bottle. The Electric Rabbit has plenty to be abuzz about.

#### Where To Go Electric Rabbit Hunting:

Crate & Barrel, Chef's Catalog, Sur La Table, Macy's, Dillard's, Spec's, Le Gourmet Chef, Kitchen Kapers, Total Wine and More, BevMo!

metrokane  
metrokane.com

## HOW 2.0 YOU BUILT WHAT?! (CONTINUED FROM PRECEDING PAGE)

programs that alter the patterns in which the LEDs flash and added a 2.4-gigahertz antenna to the controller so it could receive commands from the iPhone.

As expected, transforming himself into a walking disco light show made him a hit at Nerd Gras this past September. The best compliment of the night, he says, was an onlooker who yelled, "You're a walking seizure!"—GREGORY MONE

### HOW IT WORKS

TIME: ONE MONTH COST: \$1,300

#### IPHONE

The iPhone sends a wireless signal to the controller, which communicates with each of the 200 LEDs. Through the iPhone interface, DeVids can choose from a series of preset programs he wrote that create moving splotches, wide rings or small dots of bright light. He can adjust the direction and speed of the light patterns, alter the colors, and more.

#### SENSORS

DeVids also added an accelerometer to the wrist of one arm, sewed a small microphone into a glove, added two buttons to the fingers, and hooked it all to the controller. When he raises his arm, the motion sensor signals the controller to extend the selected

sequences along his arms (usually the LEDs just flash over his legs and torso). The microphone, meanwhile, is designed to pick up sounds so the controller can pulse all the lights in the suit in sync with the music, but he hasn't been able to adequately screen out ambient noise yet. For now, he can pulse a chosen sequence to the beat of a song by pressing the buttons in the index and middle fingers of the glove.

#### SUIT

In daylight, DeVids isn't fond of the all-white look of the suit: "I ended up looking like a milkman." But he found that white looks best when diffusing the LED light. Inspired by the way photographers diffuse flashbulb light, he further enhanced the effect by buying a sheet of nylon fabric and sewing it over the LEDs in a kind of ruffle pattern. This way the light spreads out immediately, so you just see a blur instead of the individual LEDs, which looks much cooler in the dark. "It looks like your whole set of clothes is lit up," he says.



**SPOT ON** The suit can display several different light patterns.



**MAKING LIGHT** An iPhone app controls the LEDs' pattern, color, speed and direction.

**THE H2WHOA CREDO: DIY CAN BE DANGEROUS.** We review all our projects before publishing them, but ultimately your safety is your responsibility. Always wear protective gear, take proper safety precautions, and follow all laws and regulations.

CLOCKWISE FROM LEFT: JOHN B. CARNETT; COURTESY MARC DEVIDS (2)



# 5 THINGS YOU NEED TO THROW A HOLIDAY PARTY

## 1 STOCK THE BAR

Plan the refreshments with *Thatsthe spirit.com*'s party calculator. Enter the number of guests, the proportion of beer, wine and liquor drinkers, and how much you want to spend per case or bottle. The site tells you how much to buy and what it will cost.

## 2 VOTE THE ROCK

Crowd-source the background music using *SongVote.com*. It runs a "contest" in which your friends nominate party tunes and vote on each other's selections. When the contest ends, SongVote e-mails you a playlist with links if you want to buy songs.

## 3 SING ALONG

If the playlist runs out before the booze does, open the floor to karaoke. The free-to-download UltraStar Deluxe (*ultrastardeluxe.org*) mimics PlayStation's SingStar multiplayer game series, but its open-source platform lets you use the MP3s you already have or find song files created by other UltraStar users.

## 4 CAPTURE THE MOMENT

Turn your computer into an old-time photo booth. Party Booth's (\$60 after free trial; *partyboothapp.com*) software uses your webcam to create customizable photo strips in your browser—just hit the spacebar and pose. Save, print, or load your pics onto Facebook or Twitter.

## 5 ACT OUT

Ready for one last game? The Speed Charades iPhone app (\$1.99) has more than 1,000 words for you to act out and keeps score for up to four teams. A timer ensures that things move quickly, and the game remembers which words you've already used so you won't get the same one twice.—AMANDA SCHUPAK

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PHOTOGRAPH: COURTESY NTV; ILLUSTRATION: JON ARVIZU

Our columnist heads to the Far East to prove that he's the world's greatest mad scientist

Every month for the past seven years, I've undertaken some experiment—entertaining you, dear readers, by risking my life with dangerous chemicals. But this month I conducted an experiment of an entirely different kind: I went in front of a live audience on a popular Japanese variety show and risked *their* lives with dangerous chemicals.

Japanese TV shows can be really bizarre, so it was with some trepidation and a good bit of background research that I accepted the invitation to appear on *The Most Useful School in the World*, a show hosted by Mr. Sakai, a sort of Japanese Dick Clark. The show involves “teachers” giving classroom lessons to “students” who are actually minor celebrities. I was a teacher for the science class. But the real point of the segment was a battle for the title of “Best

## WARNING

An oxy-hydrogen explosion can blow your hand off. The stunt in this story was performed under tightly controlled conditions and was overseen by a range-safety officer and fire authorities.

Science Demonstrator” between the great Denjiro-sensei, a Japanese scientist and media personality, and me, Theo-sensei, come all the way from the U.S. to defend the honor of American mad scientists. (Seriously, that's what it said in the script.)

We did four experiments, but my favorite was when I spread small soap bubbles filled with a mixture of butane and hydrogen along a line of outstretched hands belonging to a spectrum of those minor celebrities. When I lit one end of the line of bubbles, a flame swept rapidly from one hand to the next. What we didn't tell anyone was that the bubbles in the last hand were different. They contained a mixture of hydrogen and oxygen, which exploded rather loudly. The last person in the line jumped up and staggered around, terrified, while the audience roared.

The script called for Mr. Sakai to declare the match a draw, so we

never officially determined who was the better Science Demonstrator. Still, I learned a lot from the experience, especially the great appreciation the Japanese have for the value of doing science at home. In Japan you can buy hydrogen gas for your experiments in cans that look just like hairspray except that they say “hydrogen” on them. The Tokyu Hands department store has a whole aisle of home lab supplies, including beakers, Bunsen burners and chemicals. You've got to hand it to a country where you can buy nearly everything you need to make gunpowder in a chain store (as opposed to ours, where you can buy only the finished gunpowder).

In the coming months I will re-create for you some of the demonstrations Denjiro and I did on the show, though sadly without the theme music or outlandish costumes.—THEODORE GRAY

To order Gray's collection of PopSci columns, *Mad Science*, go to [periodictable.com](http://periodictable.com).



# YOU MAY BE A MAN OF FEW WORDS BUT YOU KNOW HOW TO MAKE THEM COUNT.

## WHEN THERE'S SOMETHING WORTH SAYING, YOU SAY IT.

So if you're like millions of men who have some degree of erectile dysfunction (ED), talk to your doctor. Ask about VIAGRA, America's most prescribed ED treatment. 20 million men already have.

For more information go to [viagra.com](http://viagra.com) or call 1-888-484-2472 (1-888-4VIAGRA).

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**VIAGRA<sup>®</sup>**  
(sildenafil citrate) tablets

## WITH EVERY AGE COMES RESPONSIBILITY. IMPORTANT SAFETY INFORMATION BELOW.

We know that no medicine is for everyone. Don't take VIAGRA if you take nitrates, often prescribed for chest pain, as this may cause a sudden unsafe drop in blood pressure.

Talk with your doctor first. Make sure your heart is healthy enough to have sex. If you have chest pain, nausea, or other discomforts during sex, seek medical help right away.

In the rare event of an erection lasting more than four hours, seek immediate medical help to avoid long-term injury.

In rare instances, men who take PDE5 inhibitors (oral erectile dysfunction medicines, including VIAGRA) reported a sudden decrease or loss of vision, or sudden decrease or loss of hearing. It is not possible to determine whether these events are related directly to these medicines or to other factors. If you experience any of these symptoms, stop taking PDE5 inhibitors, including VIAGRA, and call a doctor right away.

The most common side effects of VIAGRA are headache, facial flushing, and upset stomach. Less common are bluish or blurred vision, or being sensitive to light. These may occur for a brief time.

VIAGRA does not protect against sexually transmitted diseases including HIV.

Please see Important Facts for VIAGRA on the following page or visit [viagra.com](http://viagra.com) for full prescribing information.

*You are encouraged to report negative side effects of prescription drugs to the FDA. Visit [www.FDA.gov/medwatch](http://www.FDA.gov/medwatch) or call 1-800-FDA-1088.*

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## IMPORTANT FACTS

**VIAGRA**<sup>®</sup>  
(sildenafil citrate) tablets

(vi-AG-rah)

### IMPORTANT SAFETY INFORMATION ABOUT VIAGRA

Never take VIAGRA if you take any medicines with nitrates. This includes nitroglycerin. Your blood pressure could drop quickly. It could fall to an unsafe or life-threatening level.

### ABOUT ERECTILE DYSFUNCTION (ED)

Erectile dysfunction means a man cannot get or keep an erection. Health problems, injury, or side effects of drugs may cause ED. The cause may not be known.

### ABOUT VIAGRA

VIAGRA is used to treat ED in men. When you want to have sex, VIAGRA can help you get and keep an erection when you are sexually excited. You cannot get an erection just by taking the pill. Only your doctor can prescribe VIAGRA.

VIAGRA does not cure ED.

VIAGRA does not protect you or your partner from STDs (sexually transmitted diseases) or HIV. You will need to use a condom.

VIAGRA is not a hormone or an aphrodisiac.

### WHO IS VIAGRA FOR?

Who should take VIAGRA?

Men who have ED and whose heart is healthy enough for sex.

Who should NOT take VIAGRA?

- If you ever take medicines with nitrates:
  - Medicines that treat chest pain (angina), such as nitroglycerin or isosorbide mononitrate or dinitrate
- If you use some street drugs, such as "poppers" (amyl nitrate or nitrite)
- If you are allergic to anything in the VIAGRA tablet

### BEFORE YOU START VIAGRA

**Tell your doctor if you have or ever had:**

- Heart attack, abnormal heartbeats, or stroke
- Heart problems, such as heart failure, chest pain, or aortic valve narrowing
- Low or high blood pressure
- Severe vision loss
- An eye condition called retinitis pigmentosa
- Kidney or liver problems
- Blood problems, such as sickle cell anemia or leukemia
- A deformed penis, Peyronie's disease, or an erection that lasted more than 4 hours
- Stomach ulcers or any kind of bleeding problems

**Tell your doctor about all your medicines.** Include over-the-counter medicines, vitamins, and herbal products. Tell your doctor if you take or use:

- Medicines called alpha-blockers to treat high blood pressure or prostate problems. Your blood pressure could suddenly get too low. You could get dizzy or faint. Your doctor may start you on a lower dose of VIAGRA.
- Medicines called protease inhibitors for HIV. Your doctor may prescribe a 25 mg dose. Your doctor may limit VIAGRA to 25 mg in a 48-hour period.
- Other methods to cause erections. These include pills, injections, implants, or pumps.
- A medicine called REVATIO. VIAGRA should not be used with REVATIO as REVATIO contains sildenafil, the same medicine found in VIAGRA.

### POSSIBLE SIDE EFFECTS OF VIAGRA

Side effects are mostly mild to moderate. They usually go away after a few hours. Some of these are more likely to happen with higher doses.

**The most common side effects are:**

- Headache
- Feeling flushed
- Upset stomach

**Less common side effects are:**

- Trouble telling blue and green apart or seeing a blue tinge on things
- Eyes being more sensitive to light
- Blurred vision

**Rarely, a small number of men taking VIAGRA have reported these serious events:**

- Having an erection that lasts more than 4 hours. If the erection is not treated right away, long-term loss of potency could occur.
- Sudden decrease or loss of sight in one or both eyes. We do not know if these events are caused by VIAGRA and medicines like it or caused by other factors. They may be caused by conditions like high blood pressure or diabetes. If you have sudden vision changes, stop using VIAGRA and all medicines like it. Call your doctor right away.
- Sudden decrease or loss of hearing. We do not know if these events are caused by VIAGRA and medicines like it or caused by other factors. If you have sudden hearing changes, stop using VIAGRA and all medicines like it. Call your doctor right away.
- Heart attack, stroke, irregular heartbeats, and death. We do not know whether these events are caused by VIAGRA or caused by other factors. Most of these happened in men who already had heart problems.

If you have any of these problems, stop VIAGRA. Call your doctor right away.

### HOW TO TAKE VIAGRA

**Do:**

- Take VIAGRA only the way your doctor tells you. VIAGRA comes in 25 mg, 50 mg, and 100 mg tablets. Your doctor will tell you how much to take.
- If you are over 65 or have serious liver or kidney problems, your doctor may start you at the lowest dose (25 mg).
- Take VIAGRA about 1 hour before you want to have sex. VIAGRA starts to work in about 30 minutes when you are sexually excited. VIAGRA lasts up to 4 hours.

**Don't:**

- Do not take VIAGRA more than once a day.
- Do not take more VIAGRA than your doctor tells you. If you think you need more VIAGRA, talk with your doctor.
- Do not start or stop any other medicines before checking with your doctor.

### NEED MORE INFORMATION?

- This is only a summary of important information. Ask your doctor or pharmacist for complete product information OR
- Go to [www.viagra.com](http://www.viagra.com) or call (888) 4-VIAGRA (484-2472).

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## HOW 2.0 BUILD IT

## TAKE YOUR OFFICE ANYWHERE

Assemble a weatherproof, solar-powered rig that lets you use your computer for days even if you're away from civilization

**What happens** when life takes you somewhere that lacks Internet access or electricity, but you need to use your computer?

Whether you're faking out your boss while on a long fishing trip, or suffering through an extended power outage, there are times when laptop batteries won't cut it. That's when this portable solar office setup comes in handy. With a few off-the-shelf parts, you'll have continuous juice and Wi-Fi anywhere there's sun and a cellphone signal.

I opted for parts that would run my laptop in the sun for around five hours without tapping reserve battery power. Together they weigh about 70 pounds and fit in Pelican's 1550 Case. A Sun Xtender PVX-560T battery gives backup power for two sunless days, and an inverter supplies 120 volts of AC power. The rig also has a router, weatherproof connectors, and a solar panel and charge controller to keep the computer running without using reserve power. It works great no matter where I am. I'm only in my backyard right now, but I used it to write this article.—VIN MARSHALL



### MORE POWER

If you need a bigger battery with greater reserve capacity, use a cheap plastic battery box and a frame pack to get it up to your slightly less-mobile remote solar installation.



## CREATE A SOLAR OFFICE

TIME: ONE DAY COST: \$1,150 EASY □□□□ HARD

For more details and a schematic, go to [popsci.com/solaroffice](http://popsci.com/solaroffice).

- 1** Choose a secure case.  
I used a Pelican case and a fabricated aluminum frame to mount the internal components.
- 2** Securely mount the battery close to the middle of the case.
- 3** Mount the inverter and the router in the remaining space.
- 4** Prepare the control panel with holes for the mounted components and vents near the location of the inverter.
- 5** Mount the charge controller, voltmeter gauge, battery-disconnect switch, connectors, toggle switch and USB bulkhead connector.
- 6** Wire the components, and put rubber boots or heat-shrink tubing over the exposed terminals on the disconnect switch and the battery.
- 7** Install the control panel onto the panel frame in the Pelican case.



# SHOULD I BUILD MY OWN COMPUTER?



**Techies and gamers** have always preferred putting together their own PCs, but regular computer users with no special expertise can also benefit from a bit of home tinkering. Though it won't save you much money over off-the-shelf models these days unless you choose the cheapest parts, you can get a superior machine for the same price. PC vendors often switch up the parts they use between manufacturing runs, so it's almost impossible to know all the details of what you are getting inside a prebuilt model. By building your own, you can handpick better components. You'll also avoid "bloatware," programs that come loaded onto new computers, slowing down your operating system and pestering you with dialog boxes. And once you know

**JAMIE  
LENDINO**

is a freelance  
tech writer and  
PC-building  
enthusiast.

your way around the case, adding RAM or upgrading your video card down the road will be easier—especially since you can install a better power supply to handle it.

There are some caveats. If a part goes south, it will be up to you to diagnose the problem. And finding the right parts can be time-consuming. The good news, though, is that hardware conflicts are mostly a relic of the past. To get started, sites like [tomshardware.com](http://tomshardware.com) and [extremetech.com](http://extremetech.com) offer good run-throughs of the basic steps. Having a solid PC toolkit is also helpful. Try the 45-piece kit from Rosewill (\$30; [tinyurl.com/2dow3co](http://tinyurl.com/2dow3co)), which should include all the sockets and bits you need.

DOUGLAS FRASER

**GOT A QUESTION?** SEND IT TO US AT [h20@bonniercorp.com](mailto:h20@bonniercorp.com).

A collage of various objects including a brown beetle, a large yellow flower, a mechanical watch, a monarch butterfly, and a Celestron digital microscope. The word "beauty" is written in a large, elegant script across the center. Below it, the text "IS IN THE EYE OF THE BEHOLDER..." is followed by "AND IN YOUR MICROSCOPE." in orange. The advertisement promotes the Celestron deluxe LCD digital microscope, highlighting its features like a rotatable touch screen panel and built-in digital camera. It encourages users to explore, share, and record moments. The Celestron logo is at the bottom left, and the website "WWW.CELESTRON.COM" is at the bottom right. The tagline "IMAGINE THE POSSIBILITIES" is also present.

*beauty*

IS IN THE EYE OF THE BEHOLDER...  
AND IN YOUR MICROSCOPE.

Discover the intricate nature in a few of your favorite things with the deluxe LCD digital microscope from Celestron. With a rotatable touch screen panel and built-in digital camera, you can explore, share, and record each moment.  
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URGENT MESSAGE

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\*Thanks to Chad Sagnip for project idea and photographs

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**3.** Drill a hole in the pot large enough to fit a grill thermometer.

**4.** Place a stainless-steel pan on top of the range. (If you have one with a handle, remove the handle using a Dremel.) Place wood chips in the pan, and a grill grate in the pot above the pan.

**5.** Throw some ribs on the grill grate, put the cover on the pot, put it in an open area, and start cooking. For more details, search for "DIY smoker" on [instructables.com](http://instructables.com).



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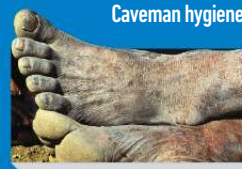
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# FYI

## THE THINGS YOU NEED TO KNOW

**102**

Caveman hygiene



## Q CAN SKYSCRAPERS PREVENT TORNADOES?

**A** It's true that the plains of Kansas are a more familiar backdrop for tornadoes than Times Square, but the funnels can form just about anywhere if the conditions are right.

The reason Tornado Alley, the area stretching from Texas to South Dakota and from the Rocky Mountains to Kansas, is the most active tornado spot in the U.S.—it sees hundreds a year—is not because it's flat farmland. It's because tornadoes form when two opposite weather systems collide under certain conditions, and this occurs with great regularity in Tornado Alley. During springtime in that region, a constant stream of cool, dry air blowing southeast from Canada runs into a similarly steady stream of warm, moist air moving northwest from the Gulf of Mexico. As these weather fronts

interact, they build high-intensity thunderstorms that, if they're strong enough, can create a powerful updraft of air. Low pressure at the ground and in the middle or upper atmosphere interacts with the rising air to create a swirling vortex that can eventually extend a tornado funnel to the ground.

It just so happens that most cities with a lot of skyscrapers are situated in places where tornado-feeding conditions evolve less frequently. But tornadoes do in fact sometimes hit cities, says Gary Conte, a warning-coordination meteorologist at the Upton, New York, outpost of the National Weather Service, citing recent touchdowns in Dallas, Memphis, Miami and four of New York City's five boroughs (Manhattan has been spared, so far). Skyscrapers and topography don't matter. "Tornadoes

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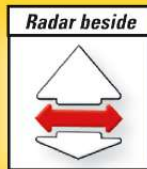
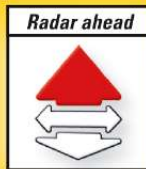


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**FYI**

form thousands of feet above building tops," Conte says. "Skyscrapers won't prevent the funnel from coming down, but they might influence its shape so that it doesn't look as nice and neat as it does on a flat surface like the plains. That doesn't make it any less of a tornado, though."

—BJORN CAREY

## Did cavemen get athlete's foot?

Hard to know, says Will Harcourt-Smith, an expert on early-human fossils at the American Museum of Natural History in New York. "Some infections leave their mark on bones. Athlete's foot is not one of those infections. But if we make some logical assumptions, we might be able to make a good guess."

Athlete's foot is a fungal infection of the skin—typically by fungi of the *Trichophyton* genus—that causes skin to scale, flake, and itch. Which makes us ask: Did cavemen even encounter this fungus? "The fungus that causes athlete's foot was definitely around back then, and probably much earlier," says Tim James, who specializes in fungi evolution at the University of Michigan. "Like all fungi, it thrives in moist, unhygienic environments, which is why most people pick it up in locker rooms. I don't imagine that a caveman's dwelling, with a dirt floor covered in animal remains, was a very sterile place."

But just walking around in fungus doesn't cause athlete's foot. Cavemen would have had to have worn shoes. "It turns out that athlete's



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foot is a disease of shod populations,” says Bob Neinast, the lead blogger for the Society of Barefoot Living. “Anyone can pick up the fungus, but the thing to keep in mind is that it grows really well in a warm, dark, moist environment. That’s the inside of a shoe.” People who go barefoot, Neinast says, rarely get athlete’s foot, most likely because exposure to fresh air keeps their feet too dry for the fungus to take hold and multiply.

Which leads us to ask: Did cavemen go barefoot? “Within around 10,000 years ago, people had lovely shoes,” Harcourt-Smith says. Our ancestors might have moved out of caves and into small villages by that time, he notes, but their footwear was still quite primitive, consisting of leather wrappings sometimes stuffed with grass for insulation (at least during cold weather). “If the shoes got damp and the person wore them often enough, that could have encouraged athlete’s foot,” he says.

Even the worst case of athlete’s foot wouldn’t have killed a caveman, but it could have impaired his quality of life. “If the irritation gets bad enough, it will stop you in your tracks,” says Cody Lundin, an outdoor-survival-skills instructor who has gone barefoot for 20 years. “That would be unacceptable for a hunter population.” Without antifungal sprays or creams, how would they have fought the burn? They might have been able to cook up a remedy. “If you take the green parts of a juniper plant and boil them, the mix makes a wonderful fungicide that will work on athlete’s foot. Indigenous people might have used it,” Lundin says. “Works great on jock itch, too.”—B.C.

### How would NASA rescue an astronaut who floated away from the International Space Station?

It’s never happened, and NASA feels confident that it never will.

For one thing, astronauts generally don’t float free. Outside the ISS, they’re always attached to the spacecraft with a braided steel tether, which has a tensile strength of 1,100 pounds. If it’s a two-person spacewalk, oftentimes the astronauts are also hooked to each other.

Should the tethers somehow fail, however, astronauts have an awesome backup plan: jetpacks! Each one wears what’s called a Safer, for “Simplified Aid for Extra-vehicular activity Rescue,” a backpack with built-in nitrogen-jet thrusters that he can control with a

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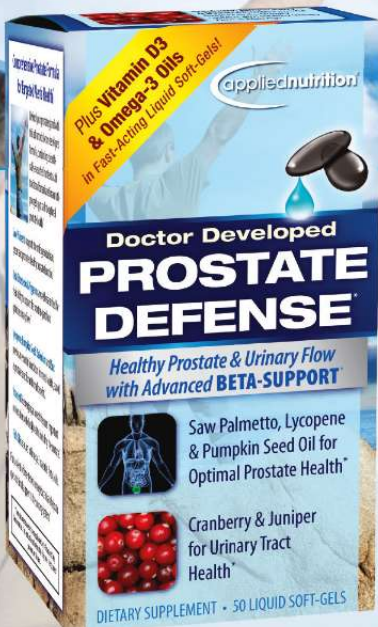


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FYI

small joystick to propel himself back to the station.

Of course, Safer is useful only if the astronaut is conscious. What if an astronaut gets bonked on the head, becomes untethered, and can't operate the jetpack? "A rescue effort could and would be undertaken by the second spacewalker and/or other members of the space-station crew," says Michael Curie, a spokesman for NASA's space operations. He wouldn't speculate on the exact steps a rescue team would take, because they would depend on the circumstances. But he adds, "we are really happy with the tether-and-Safer approach."

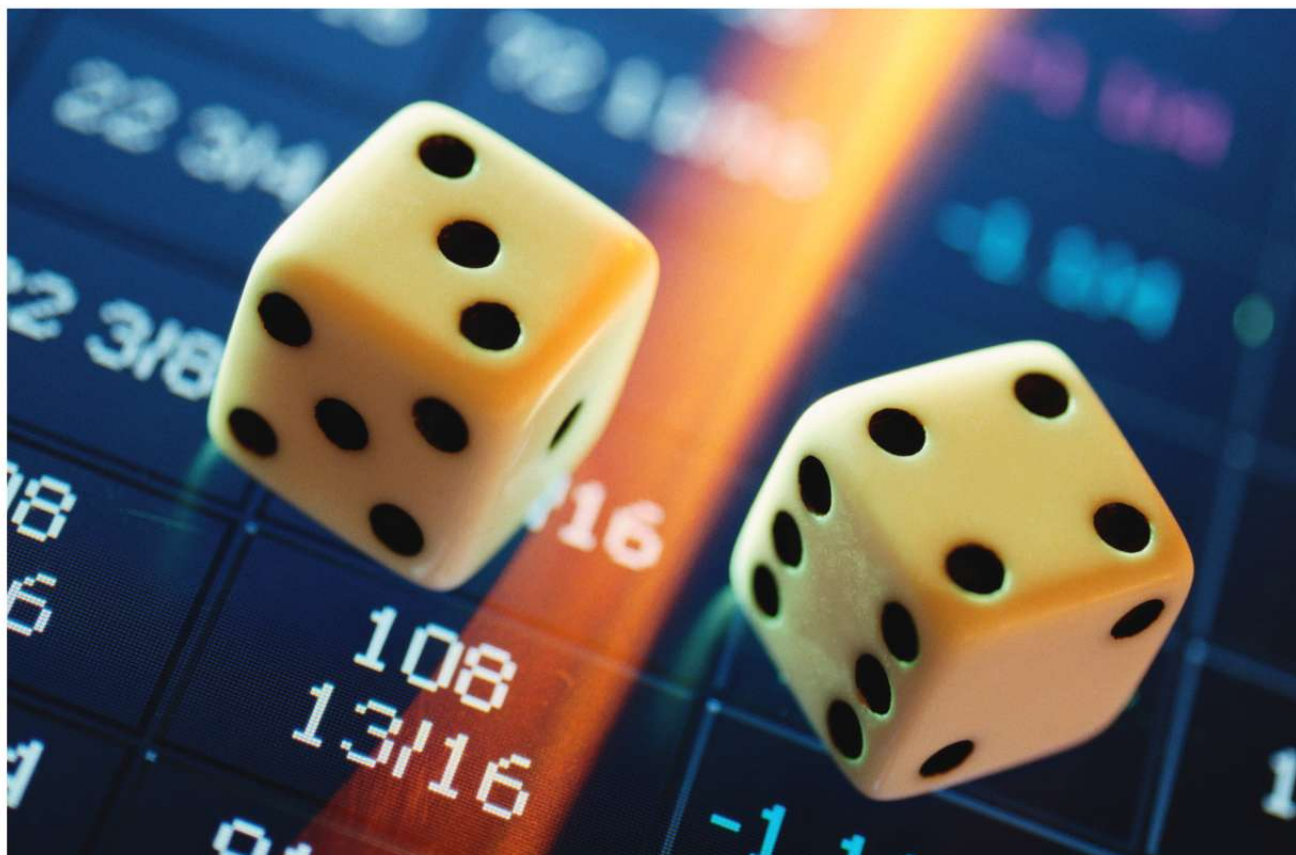
Jim Oberg, a space journalist who worked at the space shuttle's mission-control center for 22 years and specialized in rendezvous procedures, weighs in on the options for rescue. The station's robotic arm, he explains, is usually not within range of where the astronauts work and moves too slowly to grab someone. The Soyuz vehicles need a full day to power up and undock. By then, the carbon dioxide filters in the astronaut's spacesuit would run out, asphyxiating him. And the ISS cannot redirect its positioning rocket quickly enough to catch up to a runaway astronaut.

In a worst-case situation, the only rescue option, according to Oberg, would be for a second astronaut to link together several tethers end-to-end, attach them to the station, and then use his Safer pack to jet over to his crewmate and haul him in. Certain conditions could make a rescue easier, he says. If an astronaut floated away more or less at a right angle from the station's orbit, orbital dynamics (which require too much math to explain here) dictate that he would float back toward the station in about an hour.—B.C.

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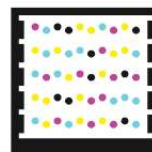
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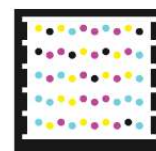


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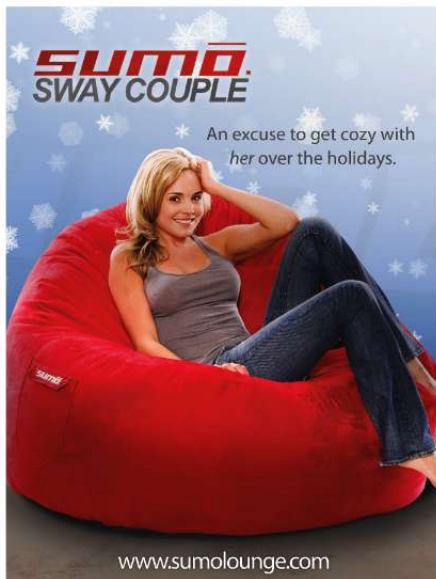
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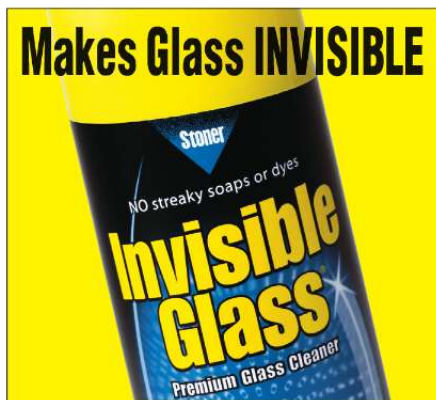
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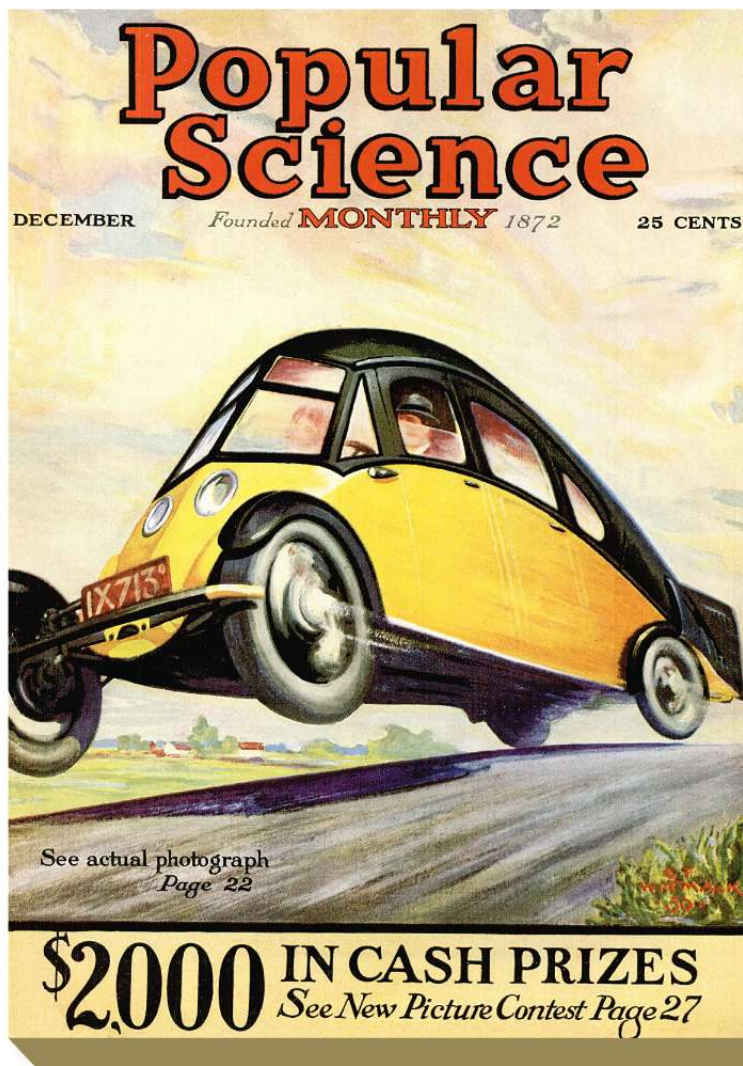
FROM THE POPULAR SCIENCE ARCHIVES

DECEMBER 1930

## Stream of Eco-Consciousness

After the 1929 stock-market crash, English airship expert Dennis Burney road-tested a car he thought would appeal to Depression-era drivers. According to Burney, his airship-inspired *Streamline* consumed only half the fuel of conventional automobiles, thanks to its crescent-shaped body, rear-mounted engine, and inset headlamps and door handles. Wind resistance was so minimal that if the *Streamline* were to accelerate to 180 mph—which, at 22 horsepower, it could not—Burney claimed it would actually take flight. Fuel efficiency wasn't enough to entice drivers, however, and the *Streamline* never made it to market. At an estimated half-million dollars or more, the new Porsche Spyder Hybrid [page 37] isn't exactly for the cash-strapped, but it does combine performance and eco-conscious technology. And although the Spyder's designers don't claim it can fly, with 718 horsepower, it just might.—NATALIE WOLCHOVER

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## More Green Cars through the Years



1994

**AUGUST 1970**  
**Fly-Wheel Drive**  
Johns Hopkins University engineer D.W. Rabenhorst designed a zero-emission car powered by a flywheel, a method used in some hybrid cars today.

**NOVEMBER 1973**  
**Diesel Demand**  
In the midst of an oil crisis, Mercedes-Benz and Peugeot introduced diesel models that were cheaper to fuel and less polluting than their gas-powered equivalents.

**JANUARY 1994**  
**Low Impact**  
In 1994 GM unveiled the Impact (left), an electric concept car with a 100-mile range that would later become the EV1, part of an electric-car program that GM famously canceled.

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